



Tribal Interview Study

Final Report

Submitted to:

Tar Creek Trustee Council Indian Tribes: The Cherokee Nation,
the Eastern Shawnee Tribe of Oklahoma, the Miami Tribe of Oklahoma,
the Ottawa Tribe of Oklahoma, the Peoria Tribe of Indians of Oklahoma,
the Seneca-Cayuga Nation, and the Wyandotte Nation;
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April 11, 2019
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1. Introduction

The Tri-State Mining District (TSMD) in Missouri, Kansas, and Oklahoma is one of the largest historic zinc mining districts in the country, covering approximately 2,500 square miles. This includes Jasper, Newton, Lawrence, and Barry counties in southwestern Missouri; Cherokee County in southeastern Kansas; and Ottawa County in northeastern Oklahoma. Lead and zinc mining and milling in the TSMD occurred from the 1870s through the 1970s, leaving behind prominent features across the local landscape, including chat piles, development and waste rock piles, and subsidence ponds (Dames and Moore, 1995). These features are a source of hazardous substances, including zinc, lead, cadmium, and other metals that have exposed and potentially injured natural resources within the TSMD.

The Tar Creek Trustee Council (TCTC) is conducting a Natural Resource Damage Assessment (NRDA) in the Oklahoma portion of the TSMD. The TCTC consists of nine Comprehensive Environmental Response, Compensation, and Liability Act natural resource Trustees, including seven Oklahoma Indian Tribes (known as the Tar Creek Trustee Council Indian Tribes, or TCTCIT), the Department of the Interior (DOI), and the State of Oklahoma. Specifically, the Trustees are the:

1. Cherokee Nation
2. Eastern Shawnee Tribe of Oklahoma
3. Miami Tribe of Oklahoma
4. Ottawa Tribe of Oklahoma
5. Peoria Tribe of Indians of Oklahoma
6. Seneca-Cayuga Nation
7. Wyandotte Nation
8. DOI through the U.S. Fish and Wildlife Service and Bureau of Indian Affairs
9. State of Oklahoma, through the Oklahoma Department of Environmental Quality (OKDEQ), the Secretary of the Environment, and the Oklahoma Department of Wildlife Conservation.

As part of the overall NRDA, the TCTCIT is assessing Tribal service losses as a result of the release of hazardous substances from the TSMD, and identifying potential types of restoration to compensate for those losses. The Tribes have unique and distinct uses of natural resources, and therefore it is important to understand the Tribal losses that have occurred and identify the appropriate restoration to compensate for these losses. To gain an understanding of the unique Tribal uses of natural resources and appropriate restoration, the TCTCIT conducted a Tribal interview study. In this study, Tribal community members and citizens, including Tribal elders, were interviewed to gather information on the Tribal losses and the types of restoration needed to compensate for these losses.

The study provides meaningful insight into the breadth of Tribal losses that have resulted from contamination of natural resources as well as Tribal priorities for options to restore injured natural resources and the flow of lost Tribal services. However, as a qualitative study, it was not designed to directly quantify these losses nor to directly estimate a monetary value of resulting damages. Therefore, this study does not provide a complete list of Tribal losses, the magnitude of those losses, nor all restoration options that may be considered appropriate to address them.

The TCTCIT contracted with Abt Associates (Abt) to assist with the study. This report provides the rationale and scope for the Tribal interview study (Section 2), a description of methods used to gather information on the Tribal losses and the types of restoration needed to compensate for these losses (Section 3), the interview study findings (Section 4), key themes from the interviews (Section 5), followed by references cited in the text (References) and the interview questionnaires used in the study (Appendices A and B).

2. Rationale and Scope for the Study

Tribal members and citizens hunt, fish, and gather within streams, lakes, and riparian habitats that are affected by hazardous substances released from the TSMD. The biological resources, and the particular locations where the Tribes hunt, fish, and gather these resources, remain integral to the Tribes' subsistence, spirituality, culture, and daily life. These resources are important for both subsistence and cultural practices of Tribal members and citizens. For example, Tribal members and citizens use fish, crustaceans, turtles, waterfowl, deer, wild turkeys, and furbearers as food resources. Mussel and turtle shells, bird feathers, deer antlers, hooves, hides, and furbearer pelts are used in Tribal regalia, crafts, and cultural practices including ceremonies; and specific geographic locations are used as cultural gathering sites.

Because particular places and biological resources are intrinsically intertwined with Tribal culture, the loss of the resource or the place (or both) necessarily causes a Tribal service loss. This can include a loss in the transference of cultural information, such as a loss of traditional education on animal tracking and hunting practices, how to gather and harvest traditional plants, and how to prepare and share traditional meals. It may also include a loss of other Tribal customs that go hand-in-hand with these practices, including spending time together as a father and son, a mother and daughter, and as a family. Through sustenance, cultural, or religious affiliation, or as a teaching tool, Tribal people depend upon healthy and uncontaminated natural resources and an environment to maintain their way of life (Seneca-Cayuga Tribe of Oklahoma, 1999; TCTC, 2009). The following examples of potential Tribal service losses were identified in the TCTC 2009 Assessment Plan (TCTC, 2009):

- *Nutritional value.* If culturally significant biological resources accumulate hazardous substances, Tribal members and citizens could choose to reduce their consumption, or choose not to ingest those resources at all. The nutritional value that was provided from ingesting the biological resources in traditional ways is lost to Tribal members and citizens.
- *Cultural value.* If culturally significant resources accumulate hazardous substances, Tribal members and citizens could choose not to utilize those resources for a culturally significant purpose, or to use them less. The cultural value that was provided from using them in traditional ways is lost to Tribal members and citizens.
- *Viability and growth.* If culturally significant biological resources are, or have been, prevented from growing because of toxic concentrations of hazardous substances in aquatic habitats, Tribal members and citizens have lost a culturally important natural resource.

A number of studies have shown that due to releases from the TSMD, hazardous substances, including zinc, cadmium, and lead, are elevated in soils and sediments, as well as in biological resources that are of subsistence and cultural importance to the Tribes (OKDEQ, 2003, 2007; Schmitt et al., 2006; TEMS, 2011a; van der Merwe et al., 2011). Further, the OKDEQ has issued

Fish Consumption Advisories for the Neosho and Spring rivers within the TCTCIT Tribal areas due to elevated concentrations of lead in fish tissue (OKDEQ, 2010). However, there has been limited study of the associated Tribal service losses, and the Tribal communities have not been asked about appropriate types of restoration to compensate for these losses.

This study focused on identifying Tribal lost uses associated with injured natural resources, and appropriate restoration actions to compensate for these unique Tribal uses of resources. Specifically, the interviews were conducted to collect qualitative information about the locations and other attributes of restoration that might most appropriately address Tribal losses resulting from released hazardous substances from the TSMD. This study was neither designed to directly quantify losses nor directly estimate a monetary value of damages. While this study was designed to identify appropriate types of restoration to compensate for Tribal losses, the nine members of the TCTC, listed above in Section 1, will ultimately coordinate on the restoration project selection, as described in the Programmatic Restoration Plan and Environmental Assessment (TCTC, 2017).

3. Methods and Types of Restoration

This study focused on identifying natural resources used by Tribal members and citizens, and restoration that will restore those resources and uses that have been adversely affected by released hazardous substances. In this study, we focus on eliciting qualitative information to identify natural resources used by Tribal members and citizens, and restoration types that will restore those resources and uses that have been adversely affected by released hazardous substances, by conducting interviews with Tribal members and citizens. There is a body of literature establishing that qualitative methods are appropriate when conducting research on indigenous cultures (Kovach, 2009, 2010; Andersen and O'Brien, 2017). As a part of this qualitative study, our goal was to conduct two rounds of interviews with up to three Tribal members and citizens from each Tribe. In the first round of interviews, our objectives were to:

- Introduce the NRDA process and the concept of NRDA restoration to Tribal members and citizens
- Learn about uses of natural resources (e.g., plants, animals, water, and soil) and how associated practices may have changed because of contamination of these resources
- Ask for initial information about what types of restoration actions may appropriately compensate for any Tribal losses that have occurred.

In the second round of interviews, our objectives were to:

- Improve our understanding of how practices may have changed because of contamination of these natural resources
- Learn more about the types of restoration actions that may appropriately compensate for Tribal losses.

Below we describe our methods for developing the two rounds of questionnaires (Section 3.1), conducting the two rounds of interviews (Section 3.2), and compiling information after each round of interview (Section 3.3).

3.1 Develop Questionnaires

We developed two rounds of interview questionnaires. These questionnaires asked Tribal members and citizens about their uses of natural resources (e.g., plants, animals, water, and soil) and how associated practices may have changed because of contamination of these resources. We asked questions about family participation in Tribal activities, including children and grandchildren participation; and uses of natural resources, including cultural knowledge transfer across generations. The inquiries then focused on asking Tribal members and citizens about which types of actions could best restore the affected resources and lost uses they just described. This included information about the locations and particular restoration attributes that could most appropriately address Tribal losses, and how to restore Tribal services.

These interviews built upon information from the 2009 and 2011 Tribal Cultural Resource Surveys, which documented the types of natural resources used by Tribal members and citizens, and the general impact contamination may have on the use of these natural resources (TEMS, 2009, 2011b). The Tribal Environmental Management Services surveys asked for general information about the impacts of contamination. This study expanded upon previous surveys, focusing in particular on identifying potentially appropriate restoration to compensate for Tribal losses.

3.1.1 Round One Interview Questionnaire

Round one questions focused on (1) how Tribal members and citizens use natural resources in traditional and subsistence practices, (2) how these practices may have changed as a result of hazardous substances released from the TSMD, and (3) a preliminary identification of restoration project ideas that could compensate for the losses. We first developed a draft questionnaire for the first round of interviews, which we distributed to the Tribal NRDA representatives. We then conducted a series of Webinars with each individual Tribe. Participants on these calls included NRDA Tribal representatives; Tribal cultural resource specialists, including the Tribal Historic Preservation Officer or other cultural department and program staff; and other Tribal representatives as appropriate. During these calls, we provided an overview of the NRDA process, discussed the purpose of the study, and reviewed and refined the potential interview questions to ensure that the question wording was respectful and culturally appropriate. We also attempted to identify interviewees from each individual Tribe and discuss the appropriate structure and venue for the Tribal interviews (e.g., one-on-one interviews versus small group interviews, locations to conduct the interviews).

Tribal NRDA representatives and Tribal cultural specialists approved the questionnaire with a suggestion that Abt replace the term “natural resources” with specific examples of natural resources. In the questionnaire, natural resources refer to plants (such as arrowhead, wild onions, roots and bulbs, legumes, and squash and other vegetables), animals (such as fish, crayfish, frogs, mussels, birds, furbearers, and wild game), water (including streams and springs), soil, as well as places (such as areas of stream water or gigging locations) that may have been affected by mining contamination. In the questionnaire, we refer to natural resources as “plants, animals, water, and soil.” Per comments, we also revised our reference to contamination to include a reference to chat. We incorporated all verbal and written feedback into the questionnaire.

We then circulated the revised questionnaire to the Tribal NRDA representatives and Tribal cultural specialists for final review and approval. The interview material was similar across all

seven Tribes, though there were slight differences for individual Tribes. For example, the Tribes differ in how they refer to individuals within their tribal community (e.g., citizen versus member), and we tailored the interview questions to reflect this.

See Appendix A for the round one interview questionnaire.

3.1.2 Round Two Interview Questionnaire

The questionnaire for the second round of interviews focused on (1) improving our understanding of how Tribal practices may have changed because of contamination of natural resources, and (2) learning about the types of restoration actions that could compensate for those Tribal losses. The findings from the first round of interviews informed the development of the round two questionnaire. For example, we focused our questions on restoration concepts that emerged from the first round of interviews.

We first developed a draft questionnaire for the second round of interviews, which we distributed to the Tribal NRDA representatives. We then conducted a Webinar with the Tribal NRDA representatives from all seven Tribes. During this Webinar, we discussed key themes that emerged from the round one interviews and reviewed the round two draft questionnaire outline, including preliminary restoration project ideas. Tribal NRDA representatives provided preliminary feedback on the round two questionnaire. For example, Tribal NRDA representatives provided information about the preliminary restoration project ideas, such as information about Tribes' current cultural resource programs, to help improve the restoration project descriptions. We took into consideration Tribal representative comments as we finalized the round two questionnaire and handouts. Once we finalized the interview materials, we circulated the questionnaire to the Tribal representatives for final review and approval.

See Appendix B for the round two interview questionnaire and handouts.

3.2 Conduct Interviews

Once the questionnaires were approved, we scheduled interview sessions with Tribal members and citizens. Our goal was to interview one to three Tribal members and citizens from each Tribe. Tribal NRDA representatives or cultural resources specialists identified the interviewees, focusing on interviewees who lived in the affected area and who they believed would be willing to participate in the interviews. The interview format varied somewhat by Tribe, in accordance with individual Tribal norms and practices. For some Tribes, we interviewed small groups of Tribal members and citizens from a single Tribe. In other instances, we conducted one-on-one interviews with Tribal members and citizens, or Tribal representatives conducted the interview due to the sensitive nature of the information being discussed. In the latter case, we trained the Tribal representative on the interview process, prior to their conducting the interview.

During the first round of interviews, we or the Tribal representatives interviewed 17 Tribal members or citizens; during the second round of interviews, we or Tribal representatives interviewed a total of 15 Tribal members or citizens from the 7 Tribes. Interviewees ranged in age from their 20s to late 80s, though most were between 40 and 80 years of age. Approximately 70% were male and 30% were female. In most instances, one or more NRDA Tribal representative or Tribal cultural resource specialists were present for the interview. Exhibit 1 describes the interviewees and the interview formats by Tribe.

Exhibit 1. Number of interviewees and format of interviews by Tribe

| Tribe | Round one interviewees | Round two interviewees |
|-------------------------------------|--|---|
| Cherokee Nation | Abt conducted a one-on-one interview with two citizens of the Tribe and Tribal representatives conducted a one-on-one interview with the third citizen of the Tribe. | Same interviewees and format as the round one interviews. |
| Eastern Shawnee Tribe of Oklahoma | Abt conducted a small group interview with three members of the Tribe. | As the interviewees from the first round of interviews were unavailable, Abt conducted a group interview with two cultural staff members of the Tribe. |
| Miami Tribe of Oklahoma | Abt conducted a small group interview with three members of the Tribe. | Same interviewees as the round one interview. Abt conducted a small group interview with two of the three members, and a one-on-one interview with the third member of the Tribe. |
| Ottawa Tribe of Oklahoma | Abt conducted one-on-one interviews with two members of the Tribe. | Same interviewees and format as the round one interviews. |
| Peoria Tribe of Indians of Oklahoma | Abt conducted a small group interview with two members of the Tribe. | As one interviewee from the round one interviews was unavailable for the round two interviews, Abt conducted a one-on-one interview with one member of the Tribe. |
| Seneca-Cayuga Nation | Abt conducted a small group interview with two members of the Tribe. | As one interviewee from the round one interviews was unavailable for the round two interviews, Abt conducted a one-on-one interview with one member of the Tribe. |
| Wyandotte Nation | Abt conducted a small group interview with two members of the Tribe. | Same interviewees and format as the round one interviews; however, Abt conducted an additional interview with a third member of the Tribe. |

We held the first round of interviews the week of December 4–8, 2017 and the second round of interviews the week of July 16–20, 2018. Two Abt team members participated in each interview: an interviewer and a dedicated note taker. The Abt interviewers had experience conducting interviews and focus groups, and specifically experience working with Tribal members and citizens. The interviewer focused on talking with Tribal members and citizens, and the note taker recorded the information discussed and ensured the information was recorded consistently and accurately.

3.3 Compile Information

After each round of interviews, we compiled the information collected during the interviews. We used the compiled summaries to look for themes among the interviews.

For the round one interviews, the compiled summary describes Tribal members' and citizens' uses of natural resources in traditional practices, how these practices may have changed as a result of hazardous substances released from the TSMD, and preliminary restoration ideas that could compensate for the losses. This summary helped us to identify key themes from the round one interviews and identify gaps on which to focus during the second round of interviews. After the first round of interviews, we held a Webinar with NRDA Tribal representatives from all seven Tribes and a DOI representative on March 13, 2018, to discuss key themes that emerged from the round one interviews and to discuss the round two interviews.

For the round two interviews, the compiled summaries tracked information on the various types of restoration, including restoration project attributes such as distance, habitat features, and language; and knowledge-transfer components of restoration projects. After the second round of interviews, we also held a Webinar with Tribal NRDA representatives from all seven Tribes and

a DOI representative on August 30, 2018 to discuss key themes that emerged from the round two interviews.

4. Interview Study Findings

In this section we describe the findings from the interviews with Tribal members and citizens. We discuss the interviewed Tribal members' and citizens' cultural and subsistence uses of natural resources, including plants, animals, water, soil, and places; and how their use of natural resources or places changed because of concern over mining contamination (Section 4.1). We also describe Tribal members' and citizens' thoughts on the types of actions that could best restore the affected resources and lost uses (Section 4.2). This is a qualitative study and was not designed to provide statistically representative data. As a result, it may neither provide a complete list nor magnitude of Tribal losses, nor all restoration options that may be considered appropriate to address those losses suffered by the Tribal communities. However, it does provide meaningful insight into the wide breadth of Tribal losses that have resulted from contamination of natural resources, and Tribal priorities for restoration options to restore natural resources and the flow of Tribal services. Themes and commonalities emerged across the independently conducted interviews with all seven Tribes, which reinforces and gives weight to the findings of Tribal service losses due to hazardous substances released from the TSMD, and identified restoration options.

4.1 Tribal Losses

Interviewees described Tribal members' and citizens' cultural and subsistence use of natural resources and places, and how their use of natural resources or places changed. Based on our compilation of the interviews, we extracted several themes regarding changes in use because of contamination from TSMD historical mining practices. The interviewees communicated that Tribal members and citizens have changed their use of natural resources because of concerns about contamination from historical mining activities. The specific themes that emerged included:

- ***Reduced experience***, where the Tribal member or citizen still uses the plants, animals, water, soil, or places but the experience is reduced because of concern over the contamination.
- ***Reduced use***, where the Tribal member or citizen may reduce their or their children's or grandchildren's use of the plants, animals, water, soil, or places because of concern over the contamination.
- ***Travel substitution***, where the Tribal member or citizen travels to alternative places to use resources that they perceive as non-contaminated. This might include traveling long distances to avoid contamination.
- ***Material substitution***, where the Tribal member or citizen uses substitute materials that they perceive as non-contaminated, such as store-bought substitutes.
- ***Cessation***, where the Tribal member or citizen no longer participates in certain activities or goes to certain places because of the contamination.

Below, we summarize by themes the cultural and subsistence uses of plants, animals, water, and soil as described by the interviewees; and describe how Tribal member and citizens have changed their use of natural resources over time as the result of the contamination.

4.1.1 Gathering and Harvesting Plant Resources

The interviewees indicated that Tribal members and citizens traditionally use plant resources in many different ways. Tribal members and citizens gather plant roots, stems, leaves, and seeds from terrestrial and aquatic habitats throughout the year, often along streambanks. Once gathered, the plants are dried, frozen, canned, or used fresh. The interviewees indicated that Tribal members and citizens use plant resources as a food source, such as wild asparagus and poke; for teas and medicinal purposes, such as wild cherry bark, dandelion, slippery elm, wild rose hips, and milkweed; for traditional ceremonies, such as strawberries, blackberries, and tobacco (Exhibit 2); for basket-making materials, such as cattail, buck brush, and grapevine; and for dyes, such as mulberry, sassafras, alder, buffalo berry, wild plum, and chokecherry.

Tribal members and citizens have changed their use of plant resources because of concerns about contamination from historical mining activities. Interviewees indicated reduced use and cessation of plant gathering, as well as increased travel time and material substitution of plant resources. We describe the themes that emerged from gathering and harvesting plant resources in greater detail below. Exhibit 3 provides a summary of the plants identified by interviewees, the traditional and subsistence uses described by interviewees, and examples of changes in the use of these resources.



Exhibit 2. Minnie Thompson, Tribal interpreter for the Seneca-Cayuga at Greencorn feast.

Source: Seneca-Cayuga Tribe of Oklahoma, 2015.

Exhibit 3. Use of plant resources and changes in the use of plants as expressed by interviewees

| Plant categories (with examples) ^a | Traditional and subsistence use of plant resources | Change in the use of plant resources and the reason for this change in use |
|--|---|--|
| Bark and leaves (ash, buckbrush, cattail, cedar, hackberry, hickory, maple, pecan, slippery elm, sycamore, walnut, willow) | Materials for weaving, dyes, and traditional crafts; teas and medicinal uses; wood for houses and ceremonial uses; and food source. | <ul style="list-style-type: none"> Stopped using buckbrush for cultural crafts because of contamination concerns from historical mining activities. Substitute cattail stems and leaves for cultural crafts with bamboo purchased at the store because of contamination concerns from historical mining activities. Concern about harvesting syrup from maple trees because of contamination from historical mining activities. |

Exhibit 3. Use of plant resources and changes in the use of plants as expressed by interviewees

| Plant categories (with examples) ^a | Traditional and subsistence use of plant resources | Change in the use of plant resources and the reason for this change in use |
|---|---|---|
| Fruits and berries (blackberry, blueberry, mulberry, pawpaw, persimmons, wild cherry, wild grapes, wild plums, wild strawberry) | Materials for dyes and traditional crafts, teas and medicinal uses, ceremonial uses, and food source. | <ul style="list-style-type: none"> Concern about gathering blackberries, strawberries, mulberries, and other berries because of contamination from historical mining activities. Some travel 25 to 80 miles to collect non-contaminated wild strawberries for ceremonies. Difficult to collect fruits and berries because of lack of access to land where plants are growing in the wild. |
| Greens (cattail, curly dock, horsemint, Lamb's quarters, mint grass, mullein, poke, watercress, wild asparagus, wild lettuce) | Materials for teas and medicinal uses, ceremonial uses, and food source. | <ul style="list-style-type: none"> Substitute cattail greens (food source) with other greens purchased at the store because of concerns about contamination from historical mining activities. Stopped gathering horsemint because of contamination from historical mining activities or travel 45 to 60 miles to gather horsemint in areas considered free of contamination. Sometimes substitute with non-contaminated sweet grass. Stopped gathering mint grass because of concerns about contamination from historical mining activities. Stopped gathering watercress because of contamination from historical mining activities or travel up to 45 minutes to gather watercress in areas considered free of contamination. Stopped or limited gathering of asparagus in areas with contamination, including wild asparagus growing on and adjacent to chat piles. Travel to gather wild asparagus in areas considered free of contamination. |
| Nuts and seeds (cattail, corn, acorns, hickory nuts or Kanuchi, pecans, walnuts, and sunflower seeds) | Materials for teas, dyes, and food source. | <ul style="list-style-type: none"> Substitute cattail nuts and seeds (pollen used like flour) with flour purchased at the store because of concerns about contamination from historical mining activities. Concern about harvesting walnuts and pecans because interviewees are noticing a trend toward smaller and lighter nuts. Unclear if mining contamination is causing the change in nut size and coloring. |
| Roots and bulbs (arrowroot, cattail roots, sassafras roots, wild carrot, and wild onions) | Materials for teas and medicinal uses, and food source. | <ul style="list-style-type: none"> Stopped or limited gathering of wild onions in areas with contamination. Travel to gather wild onions in areas considered free of contamination. |

a. Lists examples of plant resources mentioned by interviewees, even if interviewees did not specify the use or changes in use of the resource.

Reduced use and cessation of plant gathering and harvesting. Many of the interviewed Tribal members and citizens stated that they have stopped gathering plant resources, such as wild onions or watercress, in locations they perceived as contaminated. Wild onions are traditionally prepared for feasts or dinners. One Tribal member indicated that she and her family used to collect wild onions “by the truckload.” The interviewee and her family no longer collect wild onions in any areas where they are concerned about contamination or chat. Several other interviewees also indicated that they stopped or limited the amount of wild onions they gather because of concerns about contamination. Other interviewees indicated that there are also other factors affecting their use of plants (e.g., places where they used to gather wild onions either no

longer grow wild onions or the interviewees no longer have access to the places because of private property restrictions).

Travel substitution. Some of the interviewees indicated that they and other Tribal members and citizens travel long distances to harvest and gather non-contaminated, culturally important plants resources, such as strawberries or watercress. For example, Tribal members and citizens traditionally gathered local, wild strawberries for the Strawberry Dance, which, according to one interviewee, is a “time to thank the Creator for the first fruit of the season.” Because of concerns about contamination, many Tribal members and citizens travel long distances to places they perceive as non-contaminated to gather wild strawberries. Interviewees indicated that they will travel approximately 20 miles toward Kelso, Oklahoma, or about 85 miles toward Tulsa, Oklahoma, to gather wild strawberries for the Strawberry Dance. The Tribes will delay the dance until they can collect a cup of wild strawberries. Traveling long distances to gather plant resources increases the economic expense of the activity and may decrease the value of the activity. Tribal losses associated with harvesting trips taken to other locations can also be significant when the lost areas are culturally significant sites.

Material substitution. Interviewees indicated that they and other Tribal members and citizens also use substitutes for many plant resources. For example, cattail has many traditional uses; however, Tribal members and citizens who are concerned about the contamination of cattail by released hazardous substances often substitute cattail with non-contaminated materials and ingredients, such as store-bought bamboo to substitute cattail stems and leaves used in crafts, basket-making, and mat-making; or store-bought flour to substitute ground cattail pollen.

In addition to losses in plant use, Tribal members and citizens have also lost the use of places adversely affected by the release of hazardous substances. For example, the Miami Nation lost important cultural grounds because of contamination at the site (Exhibit 4).

Exhibit 4. Miami Nation Labadie Cultural Grounds

The Miami Nation established the Labadie Cultural Grounds on Elm Creek. The site includes approximately 600 acres of bottomland, a stand of pawpaw trees, and many culturally significant plants. Over time, the Miami Nation built facilities on the site to support their cultural programs, including a kitchen, a cultural education area, and camp buildings. The Miami Nation held their annual summer youth camp at the site where they taught traditional gathering practices, took children on hikes to identify culturally significant edible plants, and had children play in the water. In November 2011, the Tribe banned harvesting at the site because testing of plants and soils showed high levels of lead and other metals (Miami Tribe of Oklahoma, 2011). The Tribe also suspended their youth camps on the property.

Eventually, the Tribe moved their cultural grounds to another allotment, the Geboe Allotment on Four Mile Creek. The Geboe Allotment is free of contamination and has a good mix of culturally significant plant resources. However, the site lacks learning facilities, including a kitchen and camp buildings, and it is located farther away from the Tribal members. In order to attend the annual summer youth camp, children are transported via bus about six miles to the site. Although the Tribe was able to move their cultural grounds to a non-contaminated site, they have experienced significant cultural losses, including reduced value with the lack of facilities at the site and the difficulty of getting Tribal members to the site, as well as concerns about Tribal members' exposure to contamination at the Labadie Cultural Grounds when it was in operation.

4.1.2 Hunting, Fishing, and Harvesting Animal Resources

Tribal members and citizens hunt for wild game and birds; and fish, gig, and noodle for fish and other freshwater animals (Exhibit 5). Harvesting fish and game is common in the area. Many interviewed elders noted that they and their families used to harvest a meal from the creek. One interviewee noted that harvesting for subsistence is necessary because the area is economically depressed. Other interviewees stressed the importance of hunting or fishing as a family; during this time, elders would pass on hunting and fishing techniques to youth, such as making fishing poles out of willow branches and string. Other elders indicated that hunting in the area is also an important cultural activity; each fall, for example, the Eastern Shawnee hunt deer or squirrels for the Bread Dance.

Tribal members and citizens have changed their use of animal resources because of concerns about contamination from historical mining activities. Several interviewees stated that they see fish with fin rot and sores, such as carp and bass; and that the mussel shells are smaller and thinner than in the past, and the shells have changed in color and are now pitted. Interviewees indicated cessation, reduced use, and reduced experience with hunting, fishing, and harvesting animal resources and travel substitution. We describe the themes that emerged from hunting, fishing, and harvesting animal resources in greater detail below. Exhibit 6 provides a summary of the traditional and subsistence uses of animal resources as described by interviewees and examples from interviewees about changes in the use of these resources.

Cessation of hunting, fishing, and harvesting animal resources. Many interviewees stated that they stopped consuming animal resources, such as fish, ducks, and squirrels; and stopped hunting, fishing, gigging, and noodling in locations where they are concerned about contamination, such as Tar Creek, Elm Creek, Spring River, and Grand Lake.

Reduced experience. Some interviewees noted that they or Tribal members and citizens they know still use some animal resources, but that the experience of using animal resources for cultural activities is reduced because of concern over the contamination. For example, one elder's husband who used mussel shells for arts and crafts would "suit up like a spaceman" to collect mussels to reduce contact with contaminated water and sediment while collecting the mussel shells. Near Grove, Oklahoma, some Tribal members and citizens wear gloves when fishing and only practice catch-and-release of fish.



Exhibit 5. Hastings Shade walks with fish he caught with homemade gig.

Source: Jason White, Environmental Programs Manager, Cherokee Nation.

Exhibit 6. Use of animal resources and changes in the use of animal resources as expressed by interviewees

| Animal categories (with examples) ^a | Traditional and subsistence use of animal resources | Change in use of animal resources and the reason for this change in use |
|---|--|---|
| Fish and other freshwater animals (catfish, sun perch, and other fish; crustaceans such as crawdads; eels; bullfrog, peeper frogs, and other frogs; mudpuppies and salamanders; mussels; snails; and turtles) | Traditional practices, art and ceremonial uses, food source. | <ul style="list-style-type: none"> • Stopped or limited fishing, gigging, noodling, and consuming fish because of concerns about contamination from historical mining activities. Noticed changes in fishes, including sores and fin rot on some fish species (e.g., carp and bass) and fish that are smaller and scarcer. • Stopped or limited gathering of mussels for traditional art because of concerns about contamination from historical mining activities. Some wear protective gear to collect mussels. Some have noticed a decline in mussel quantity and quality. • Noticed declining populations of bullfrogs, mudpuppies, salamanders, and snails. Concerned that mining contamination is a factor in the declining populations. |
| Wild game (deer, rabbits, raccoons and squirrels, possum, woodchuck, beavers, mink, and river otters) | Traditional practices, art, ceremonial uses, food source. | <ul style="list-style-type: none"> • Stopped or limited hunting and consuming deer, rabbits, raccoons, and squirrels because of contamination and declining populations. • Other interviewees indicated that they still hunt and consume some wild game, but indicated that they “probably should not” consume game because of contamination from historical mining activities. |
| Birds (ducks and geese, prairie chickens and quail, wild turkeys, and songbirds) | Traditional practices, art, ceremonial uses, food source. | <ul style="list-style-type: none"> • Noticed declining populations of bird species – particularly prairie chickens, quail, ducks, and geese – likely because of a mix of factors, including predation by coyotes, changes in agricultural practices that reduce habitat, and mining contamination. |

a. Lists examples of animal resources mentioned by interviewees, even if interviewees did not specify the use or changes in use of the resource.

Reduced use. Other Tribal members and citizens indicated that they still use natural resources and places, but limit their children’s and grandchildren’s exposure to affected natural resources because of concern over contamination. For example, Tribal elders will teach their grandchildren traditional or subsistence practices, but not allow them to consume the fish caught or wild game hunted. One interviewee indicated that when he was young, he would fish out of Spring River and consume the fish; this interviewee indicated that fish caught out of Spring River accounted for up to one-third of the fish the family ate while growing up. This interviewee will still eat the fish because, as he put it, he is already “contaminated.” But, he is aware of the contamination in the river. He will take his grandson to Spring River to fish, but he will only allow him to catch-and-release from the river and will not allow him to consume fish from this river.

Travel substitution. While the interviewees indicated that some Tribal members and citizens harvest and consume wild game and birds from local areas, many travel to areas they perceive as non-contaminated to hunt and purchase meat from ranchers outside the Tar Creek area.

4.1.3 Water Resources

Clean water resources – such as clear streams – are very important to the Tribal members, and water is used for harvesting and processing food, drinking, recreation, and ceremonies. The interviewees stated that they and other Tribal members and citizens have changed their use of water resources because of concerns about contamination from historical mining activities. Interviewees indicated reduced use and cessation of swimming, fishing, gigging, and drinking in rivers, streams, creeks, and springs in the area; as well as reduced experience and travel substitution of water resources. We describe the themes that emerged about Tribal practices that involve water in greater detail below. Exhibit 7 provides examples from interviewees about Tribal uses of water and changes in the use of water.

Exhibit 7. Use of water resources and changes in the use of water as expressed by interviewees

| Water categories (with examples) ^a | Use of water | Change in use of water and the reason for this change in use |
|---|---|--|
| Lakes (Grand Lake) | Swimming and fishing, food source for fish caught out of the lakes. | <ul style="list-style-type: none"> Stopped swimming and fishing in Grand Lake because of concerns about contamination from historical mining activities. Some interviewees indicated that they or other Tribal members and citizens will travel to Sycamore Creek as well as approximately 25 miles to non-contaminated water bodies to swim, including Buffalo Creek, Missouri; Galena, Kansas; or Schermerhorn, Kansas. |
| Rivers (Spring River and Neosho River) | Swimming, fishing, gigging, noodling, and drinking; food source for fish caught out of the rivers. | <ul style="list-style-type: none"> Stopped or limited swimming, fishing, gigging, and drinking in the Spring River, Neosho River, and other rivers in the area because of concerns about contamination from historical mining activities. Some interviewees indicated that they or other Tribal members and citizens will travel to Sycamore Creek as well as approximately 25 miles to non-contaminated water bodies to swim, including Buffalo Creek, Missouri; Galena, Kansas; or Schermerhorn, Kansas. |
| Creeks (Lost Creek, Elm Creek, and Tar Creek) | Swimming, fishing, gigging, noodling, and drinking; food source for fish caught out of the creeks; water for ceremonies and traditional activities. | <ul style="list-style-type: none"> Stopped or limited swimming, fishing, gigging, and drinking in Tar Creek, Elm Creek, Lost Creek, and other creeks in the area because of concerns about contamination from historical mining activities. Some interviewees indicated that they or other Tribal members and citizens will travel to Sycamore Creek as well as approximately 25 miles to non-contaminated water bodies to swim, including Buffalo Creek, Missouri; Galena, Kansas; or Schermerhorn, Kansas. |
| Springs (Beaver Spring) | Drinking and water for ceremonies and traditional activities. | <ul style="list-style-type: none"> Stopped using springs as drinking water because of concerns about contamination from historical mining activities. Stopped or limited using springs as water for ceremonies and traditional activities because of concerns about contamination from historical mining activities. |
| Groundwater or aquifers | Drinking and household water supply. | <ul style="list-style-type: none"> Concern about contamination from historical mining activities traveling through aquifers. |

a. Lists examples of water sources mentioned by interviewees, even if interviewees did not specify the use or changes in use of the resource.

Reduced use and cessation of swimming, fishing, gigging in rivers, streams, and creeks. As described in Section 4.1.2, interviewees reported that they had either stopped or less frequently go fishing and gigging in rivers, streams, and creeks. In addition, the interviewees indicated that they and other Tribal members and citizens have stopped swimming in Grand Lake, the Spring and Neosho rivers, and many creeks, including Lost Creek, Elm Creek, and Tar Creek, because of concerns about contamination.

Reduced use and cessation of springs and creeks for drinking water. Interviewees indicated that they would drink out of the creek and springs as children, but they no longer drink out of creeks and springs in the area and do not allow their children and grandchildren to drink or play in the water. For example, many interviewees noted Beaver Spring near the Quapaw powwow grounds as an area where Tribal members and citizens would gather water in buckets for drinking and play in the water as children. Now, the area has signs warning of contamination and state to not play in the spring. Interviewees said that Tribes will use well water for ceremonies, but they will not use water from many creeks and stream in the area, including Tar Creek.

Reduced experience. There is also a general fear of water contamination. For example, interviewees indicated that Tribal members are concerned about showering and drinking water from the area because of experiences with residents on the west side of Quapaw, Oklahoma, who were told not to drink the “yellow, rusty, and smelly water,” and other stories.

Travel substitution. Tribal members and citizens travel to non-contaminated water bodies to swim. Interviewees indicated that they will travel to Buffalo Creek in Missouri, Galena in Kansas, and Schermerhorn in Kansas, which are approximately 25 miles from Miami, Oklahoma. Some interviewees will swim in Sycamore Creek, which is about 25 miles from Miami, Oklahoma.

4.1.4 Soil Resources

Tribal members and citizens use clay for arts and craft (Exhibit 8). The use of soil and clay was generally less mentioned; however, some Tribal members and citizens have changed their use of soil resources because of concerns about contamination from historical mining activities. Interviewees indicated travel and material substitution of soil resources. We describe these themes that emerged from the use of soil resources in greater detail below. Exhibit 9 provides examples from interviewees about Tribal uses of soil resources and changes in the use of soil.



Exhibit 8. Clay pottery.

Source: Eastern Shawnee, 2015.

Exhibit 9. Use of soil resources and changes in the use of soil as expressed by interviewees

| Soil categories (with examples) | Use of soil resources | Change in use of soil resources and the reason for this change in use |
|------------------------------------|-----------------------|---|
| Soil and clay | Arts and crafts | <ul style="list-style-type: none"> Travel to areas not affected by the release of hazardous substances to gather clay for pottery. Substitute clay gathered from the ground with clay purchased at the store because of concerns about contamination from historical mining activities. |

Travel substitutes. One interviewee’s aunt was a famous clay potter who brought back the art form in the 1970s. She would gather clay from the ground in an area not affected by the release of hazardous substances.

Material substitutes. Another interviewee stopped using clay for arts and crafts about 20 years ago. She now purchases commercial clay from the store because of concerns over contamination, as well as convenience.

4.2 Restoration Projects

In the first round of interviews, we asked Tribal members and citizens about what types of restoration actions could best restore the affected resources and lost uses they previously described. This included information about the locations and particular restoration attributes that could most appropriately address Tribal losses, and how to restore Tribal services. A number of different restoration ideas emerged from the first round of interviews (Exhibit 10).

Exhibit 10. Restoration ideas proposed by Tribal members and citizens during round one interviews, grouped by broad restoration category

| | |
|--|---|
| <ul style="list-style-type: none"> • Land acquisition <ul style="list-style-type: none"> - Land acquisition for individual Tribes - Shared, intertribal land acquisition • Cultural and use restoration <ul style="list-style-type: none"> - Youth cultural learning camps and programs for language and traditional lifeways - Learning facilities for cultural purposes (e.g., cookhouse or community center) - Community gardens (e.g., raised garden beds or greenhouses to grow traditional foods) and food sovereignty programs - Improved recreational access, including access to hiking trails and kayaking | <ul style="list-style-type: none"> • Habitat and resource restoration <ul style="list-style-type: none"> - Habitat restoration (e.g., planting or reintroducing native species and culturally important species) on existing or newly acquired lands - Habitat conservation on private, agricultural lands through a Natural Resources Conservation Service program - Resource restoration, including raising and reintroducing mussels and fish • Other restoration ideas <ul style="list-style-type: none"> - Improvements to upstream wastewater treatment plants to improve stream water quality - Clean up contamination from upstream swine and poultry farms - Collaboration with the Grand River Dam Authority (GRDA) to reduce upstream flooding and avoid recontamination from the floodplain - Create job opportunities for youth |
|--|---|

Through a process that included a discussion with Tribal NRDA representatives, we selected restoration concepts to include in the round two questionnaire. Specifically, we selected:

1. Projects that are focused on restoring natural resources and services harmed by the released hazardous substances. NRDA restoration must be focused on restoring natural resources and services harmed by the released hazardous substances. Therefore, restoration project ideas that addressed other social or economic harms – such as lack of job opportunities and land privatization – were not included in the round two questionnaire.
2. Projects that were mentioned by multiple interviewees across multiple Tribes during the round one interviews (e.g., the majority of interviewees mentioned developing or expanding cultural youth education programs and community gardens).
3. Projects that are practically feasible (e.g., many interviewees mentioned addressing the regulation of the dam on the Grand River, which causes upstream flooding in the Neosho and Spring rivers systems). However, Tribal NRDA representatives described the practical challenges of implementing any changes to the regulation of the dam, which is overseen by a separate agency, the GRDA. Given this, we did not include it as a main restoration idea in the round two questionnaire.

Through this process, we identified and refined the following four restoration concepts to include in the round two interview questionnaire:

- Restoration of low-quality streambank habitat to create high-quality native habitat on the upper reaches of streams and creeks in locations that are not affected by the mining contamination
- Reintroduction of native mussel species into the upper reaches of streams and creeks in locations that are not affected by the mining contamination
- Cultural learning program for youth that teaches and preserves cultural practices, Tribal knowledge, and values
- Community gardens where Tribes grow and protect culturally important foods and medicines for Tribal members and citizens to use in traditional ways.

Below, we describe these restoration concepts in more detail and summarize our findings of Tribal members' and citizens' opinions on important aspects of the restoration projects. We also briefly describe several additional types of restoration mentioned by Tribal members and citizens.

4.2.1 Habitat Restoration along the Streambank

This restoration concept involves improving low-quality streambank habitat to create high-quality native habitat on the upper reaches of streams and creeks in locations that are not affected by the mining contamination. Restoration could include seeding or planting native, culturally important vegetation; installing cattle fencing to prevent cattle from grazing on the new vegetation and entering eroded streambank areas; and controlling the spread of non-native or invasive species, such as alligator weed, thistles, or purple loosestrife. The restoration will benefit biological resources by improving streambank habitat quality. The project may also benefit instream biological resources by improving instream water quality by creating a buffer zone between agricultural runoff and streams, and by reducing erosion and sediment loading into streams (e.g., Osborne and Kovacic, 1993; Henley et al., 2000; Zhang et al., 2016).

The restoration work could either occur on land that is first acquired or it could occur on land that is privately owned, such as ranch or agricultural land, with willing landowners. In the former scenario, the Tribes would implement the restoration on land that was first acquired. An advantage of conducting restoration on acquired lands is that the Tribes could be directly engaged in implementing the restoration and there is more certainty about Tribes' abilities to access and use the restored habitat. Once the habitat was restored, the Tribes could then engage in traditional activities at the site, including collecting and using plants, hunting or trapping animals, and fishing or collecting freshwater animals. In addition, the restored habitat could be maintained by the Tribes on a long-term basis. However, there may be limited opportunities to acquire land in the area because rural properties are not often available for purchase, and so it could take a long time for land to be available for sale.

Under the scenario of restoration on ranch and agricultural lands with willing landowners, the Tribes would not have access to this land to gather or collect restored plants or use the stream. Hence, the main benefits provided to Tribal members and citizens under this scenario are existence and bequest values – the knowledge that natural resources have been restored, are

healthy and providing ecological services, and will be present for future generations – even if they cannot be directly used in traditional activities. This restoration concept assumes that there are some willing landowners who would participate in this program, and it may be implemented sooner, because it is not dependent upon rural properties coming on the market.

What We Heard from the Tribes

The interviewed Tribal members and citizens generally thought that habitat restoration in the upper reaches of streams or creeks could restore resources affected by mining contamination. Interviewees envisioned restoration of native, culturally important vegetation in clean areas that allowed Tribal access to gather and use the restored resources. Interviewees were mixed in their interest to install cattle fencing that prevents cattle from grazing on restored vegetation: some interviewees indicated that there are some willing landowners who would participate in this program, while other interviewees indicated it would be difficult to find landowners willing to participate in a cattle fencing program. In general, all interviews thought controlling invasive species was a good streambank restoration project.

Additional elements of the restoration project. In addition to the restoration elements noted in the project description, interviewees were also interested in instream restoration such as streambank stabilization, adding complexity to the stream channel with pools and rocks, and cleaning up trash and debris in streams and creeks. Some interviewees expressed interest in natural trails along the restored areas with interpretive signs that describe (in English and in Native American languages) the restored plants, including the names and uses of each plant.

Potential locations. Tribal members and citizens also suggested several upper reaches of streams or creeks where restoration could occur, including the Neosho River above Elm Creek as well as upstream areas of Elm Creek, Lost Creek, Sycamore Creek, Honey Creek, and Whitewater Creek.

Tribal involvement in the restoration project. All interviewees felt that it was important to have Tribal members and citizens involved in streambank restoration activities, such as seeding and planting culturally important, native vegetation species and caring for the restoration site as vegetation matures. Interviewees felt Tribal knowledge is critical to the project's success, including knowledge on the specific types of vegetation to plant, where and when to plant it, and how to group vegetation to protect it from predation. Involving Tribal members and citizens in the streambank restoration project also improves stewardship within the community and provides an opportunity to transfer traditional knowledge from elders to youth about gathering and harvesting cultural important plants and becoming good stewards of their land. All interviewees also felt that cultural learning should be an important aspect of this project. Tribal members and citizens do not need to be paid to participate in the restoration project; however, compensation can increase Tribal members' and citizens' ability to participate in the project.

Restoration on acquired lands or with willing landowners. In general, Tribal members and citizens felt that streambank restoration should occur on acquired lands. Most interviewees indicated that access to restored land is an important aspect of a restoration project, and stressed that Tribal members and citizens will want use of the restored sites for traditional and recreational activities. Although several interviewees indicated that there are limited opportunities to buy land for habitat restoration, others indicated that each Tribe has a "wish list"

of land acquisitions and that the Tribal governments have strong preferences to restore acquired lands.

Tribal members and citizens were less enthusiastic about streambank restoration on agricultural and ranch lands. However, several interviewees stressed the benefits to land and wildlife that restoration on private land can provide. A few interviewees thought that this type of project should occur on lands owned by Tribal members and citizens or adjacent to Tribal lands. Some interviewees thought the restoration project should include a legal agreement between the landowners and the Tribes in order to protect the benefits provided by the restoration projects; however, the length of the agreement varied from 5 or 10 years to 100 years or “as long as the grass grows.” Others felt that any legal agreement would further limit the number of landowners willing to participate in the program.

How Well Does this Restoration Concept Address Injury and Tribal Losses?

The majority of interviewees stated that streambank restoration on acquired land is an extremely or very good way to make up for the impacts of the contamination from historical mining activities and that this type of project is a moderately to extremely good way to allow Tribal members and citizens to use the resources affected by contamination from historical mining activities (Exhibits 11 and 12, respectively).

Exhibit 11. How habitat restoration along the streambank restores affected natural resources

| | Acquisition + restoration | | Restoration on agricultural and ranch lands with willing landowners ^b | |
|-----------------------|---------------------------|----------------------------|--|----------------------------|
| | Number of Responses | Percent of Total Responses | Number of Responses | Percent of Total Responses |
| Extremely good way | 3 | 27.3% | 2 | 25.0% |
| Very good way | 6 | 54.5% | 2 | 25.0% |
| A moderately good way | 1 | 9.1% | 4 | 50.0% |
| A slightly good way | 1 | 9.1% | 0 | 0.0% |
| Not a good way at all | 0 | 0.0% | 0 | 0.0% |
| Total ^a | 11 | | 8 | |

a. Totals do not sum to the 15 individual interviewees because the small groups responded with one response. There were a total of 11 respondents (8 individuals and 3 small groups).

b. Two interviewees indicated that habitat restoration should not occur on ranch and agricultural lands. One interviewee did not respond to the ranch and agricultural lands question.

Exhibit 12. How habitat restoration along the streambank allows for the use of affected resources

| | Acquisition + restoration | |
|--------------------|---------------------------|----------------------------|
| | Number of Responses | Percent of Total Responses |
| Extremely well | 3 | 30.0% |
| Very well | 3 | 30.0% |
| Moderately well | 3 | 30.0% |
| Slightly well | 0 | 0.0% |
| Not well at all | 1 | 10.0% |
| Total ^a | 10 | |

a. Totals do not sum to the 15 individual interviewees because the small groups responded with one response. There were a total of 10 respondents because 1 interviewee did not respond to this question.

In general, interviewees stated that streambank restoration on ranch and agricultural lands is a moderately to extremely good way to make up for the impacts of the contamination from historical mining activities (Exhibit 11). Note that because this restoration project does not allow access to the site for Tribal uses, we did not ask the interviewees about how well this restoration concept would restore Tribal use of natural resources, and therefore there are no entries for this concept in Exhibit 12.

4.2.2 Reintroducing Native Mussels into Rivers, Streams, and Creeks

This restoration concept involves reintroducing native mussel species that are no longer present or present in fewer numbers because of the mining contamination in the upper reaches of streams and creeks. These upper reaches of uncontaminated streams and creeks may be side tributaries to the Spring and Neosho rivers. The mussels would naturally move and spread into downstream areas, after these areas are cleaned up.

What We Heard from Tribal Members and Citizens

Most interviewees noted the ecological importance of mussels as biological filters and indicators of healthy stream ecosystems, and indicated that reintroduction efforts could allow Tribal members and citizens to begin to practice cultural activities with mussels again. Interviewees from the Peoria Tribe of Indians of Oklahoma are very familiar with mussels: they have a fish hatchery where they are raising mussels and beginning to reintroduce native mussels in historical habitat (Exhibit 13). A few other interviewees thought this would be an appropriate restoration project because it would restore a resource that was used in the past. These interviewees indicated that they have gathered and used mussel shells in the past for pottery and cultural crafts and ceremonies; however, these interviewees noted the limited number and variety of mussels today, and the changes in the coloring of native mussels and increase in fragile or broken shells. Restoring mussels would create opportunities for Tribal members and citizens to resume gathering mussel shells for these traditional purposes. Other interviewees did not regularly use mussels for subsistence or cultural practices.



Exhibit 13. Native mussel species.

Source: Larry Tippit, Peoria Environmental Department, Peoria Tribe of Indians of Oklahoma.

Potential locations. Tribal members and citizens also suggested several upper reaches of streams or creeks where reintroduction could occur, including upstream areas of Elm Creek, Warrens Branch, Five Mile Creek, Flint Creek, Hudson Creek, Lost Creek, and Sycamore Creek. Other interviewees suggested reintroducing mussels “anywhere and everywhere.”

Tribal involvement in the restoration project. The majority of interviewees felt that it is important to have Tribal members and citizens involved in a program that reintroduces native mussels into rivers, streams, and creeks. Tribal members and citizens could contribute to several aspects of this restoration program, including reintroducing the mussels to the area, maintaining and monitoring the restoration project, and teaching youth about the cultural uses of mussel shells. According to many interviewees, this project is a natural fit for a youth cultural education

program, where Tribal elders or practitioners lead restoration activities and gathering of mussels post-restoration; and youth participate, learning as they help. Tribal members and citizens may need to be compensated for their participation in this type of project.

How Well Does this Restoration Concept Address Injury and Tribal Losses?

Tribal members and citizens felt that reintroducing native mussels into the area rivers, streams, and creeks is a moderately good to extremely good way to make up for the impacts of the contamination from historical mining activities (Exhibit 14); and that this type of project may allow Tribal members and citizens to use the resources affected by contamination from historical mining activities (Exhibit 15).

Exhibit 14. How reintroducing native mussels restores affected natural resources

| | Number of Responses | Percent of Total Responses |
|-----------------------|---------------------|----------------------------|
| Extremely good way | 3 | 30.0% |
| Very good way | 4 | 40.0% |
| A moderately good way | 3 | 30.0% |
| A slightly good way | 0 | 0.0% |
| Not a good way at all | 0 | 0.0% |
| Total ^a | 10 | |

a. Totals do not sum to the 15 individual interviewees because the small groups responded with one response. There were a total of 10 respondents because 1 interviewee did not respond to this question.

Exhibit 15. How reintroducing native mussels allows for the use of affected resources

| | Number of Responses | Percent of Total Responses |
|--------------------|---------------------|----------------------------|
| Extremely well | 3 | 33.3% |
| Very well | 3 | 33.3% |
| Moderately well | 2 | 22.2% |
| Slightly well | 1 | 11.1% |
| Not well at all | 0 | 0.0% |
| Total ^a | 9 | |

a. Totals do not sum to the 15 individual interviewees because the small groups responded with one response. There were a total of nine respondents because one interviewee chose not to respond to this question and another interviewee was not comfortable answering this questions because of unfamiliarity with the use of mussels.

4.2.3 Youth Cultural Learning Program

This restoration concept involves developing a cultural learning program for youth that supports Tribal communities through the teaching and preservation of cultural practices, Tribal knowledge, and values. This restoration project includes elders or teachers sharing cultural practices and Tribal knowledge with youth or students. These youth or students then share the cultural practices and Tribal knowledge with the larger community. This program is similar to culture camps that some Tribes hold over the summer, but is a more involved program that would occur year-around, and span multiple years.



Exhibit 16. Wyandotte youth cultural learning programs, including courses on beading, basket weaving, and cooking fry bread.

Source: Kathleen Welch, Wyandotte Nation Environmental Department.

What We Heard from Tribal Members and Citizens

The interviewees indicated that most of the Tribes provide a limited offering of cultural courses, classes, or camps to their members and citizens. These are usually one-week youth camps or programs during the summer, or one-time cultural crafts or cooking classes (Exhibits 16 and 17). Some of the Tribes also have language classes for youth or elders. Interviewees were very interested in developing a cultural learning program or expanding their limited offerings to teach and preserve cultural practices, Tribal knowledge, and values that have been adversely affected by released hazardous substances in the TSMD. They indicated that year-round programs that keep youth engaged in cultural practices, including language, and teach them how to seasonally gather, harvest, and use culturally important plants are an appropriate way to compensate for the Tribal services losses that have occurred.

Additional elements of the restoration project. Interviewees also mentioned several additional elements that could be incorporated into this restoration concept, including:

- Developing stewardship courses and programs that teach youth cultural processes for caring for the land
- Developing agricultural extension programs that teach traditional uses of plants, how they are used today, and how to adapt uses for modern life



Exhibit 17. Ottawa Tribe of Oklahoma working with youth.

Source: Tabitha Langston, Ottawa Tribe of Oklahoma.

- Creating online educational materials to allow members to learn about cultural practices and language.

Tribal involvement in the restoration project. Interviewees indicated that youth and elders would be very interested in participating in a cultural learning program. Many youth and elders are already participating in the more limited cultural courses, classes, or camps; and interviewees noted that there is interest in more extensive cultural programs. Interviewees suggested that artisans and elders should be compensated for their time participating in these programs. Compensation for this type of work is part of a tradition of gifting (e.g., groceries, a blanket, tobacco, or money) for advice, help, or teachings.

Supporting facilities. This project could include the development of learning facilities, such as indoor or outdoor facilities to support learning. When asked about indoor facilities that would support learning, interviewees indicated an interest in indoor kitchens to teach about the process of where to collect, gather, or hunt the resources; how to prepare, cook, or preserve the resources; and how the resources are used in different cultural activities. Interviewees also mentioned dedicated classrooms for courses with storage space and bathrooms. When asked about outdoor facilities that would support learning, interviewees mentioned greenhouses, seed banks, and habitat spaces with nature trails to teach and learn Tribal gathering (e.g., how to identify different plant resources and teach about cultural uses of the resource), as well as outdoor spaces to facilitate fishing and hunting practices. Interviewees also expressed interest in an outdoor cooking area and area for firing pottery.

Shared versus individual program facilities. These learning facilities could be shared by the Tribes or each Tribe could have their own learning facilities. When asked if learning facilities for a cultural learning program should be shared by Tribes, interviewees' responses varied. Interviewees interested in a shared facility felt that shared facilities would be more extensive than individual Tribal learning facilities, and indicated the value in learning other ways and methods for different activities. These interviewees mentioned that families are close-knit and also intermingled, and that groups of different Tribal members and citizens already gather to engage in traditional practices. Other interviewees expressed interest in regional facilities, which might support a number of Tribes with similar practices, or individual Tribe facilities to limit travel time to the facility. However, interviewees were generally willing to travel to use the learning facilities. Some Tribal members and citizens were not willing to travel far (10 to 20 minutes), while other Tribal members and citizens expressed a willingness to travel up to an hour to use learning facilities.

How Well Does this Restoration Concept Address Injury and Tribal Losses?

Tribal members and citizens felt that a youth cultural learning program will allow Tribal members and citizens to use the resources affected by contamination from historical mining activities extremely to very well (Exhibit 18).

Exhibit 18. How a youth cultural learning program allows for the use of affected resources

| | Number of Responses | Percent of Total Responses |
|--------------------|---------------------|----------------------------|
| Extremely well | 6 | 54.5% |
| Very well | 5 | 45.5% |
| Moderately well | 0 | 0.0% |
| Slightly well | 0 | 0.0% |
| Not well at all | 0 | 0.0% |
| Total ^a | 11 | |

a. Totals do not sum to the 15 individual interviewees because the small groups responded with one response. There were a total of 11 respondents (8 individuals and 3 small groups).

4.2.4 Community Gardens

Community gardens can help Tribes grow and protect culturally important foods and medicines for Tribal members and citizens to use in traditional ways. Community gardens can also provide a place for education and learning: a place where elders can teach youth about culturally important food items; and how they are grown, harvested, and prepared for eating. This restoration concept involves developing garden beds for Tribal members and citizens to grow their own food, or larger garden operations that can grow and harvest food for a larger Tribal community.

What We Heard from Tribal Members and Citizens

The interviewees indicated that most of the Tribes have some experience with community gardens in the past, either small vegetable gardens for Tribal members and citizens to grow their own food or larger gardens that grow food for the larger Tribal community. Interviewees from all seven Tribes are interested in participating in a new or expanded community garden program. The interviewees indicated that the Tribes are primarily interested in larger gardens that support heirloom and culturally important seeds and plants, plants and native grasses that could support habitat restoration, and demonstration gardens that are a component of the cultural learning program. One interviewee suggested a larger, “mother” garden that produces seeds for the smaller, more local gardens. A few interviewees suggested the importance of supporting smaller gardens for Tribal members and citizens to grow food at their homes.

Additional elements of the restoration project. Many interviewees are concerned about contamination of garden soil and airborne contamination from the chat pile. Several interviewees suggested that Tribal members and citizens would feel more comfortable participating in the community garden if garden beds were raised with soil brought in from non-contaminated areas and covered with hoop houses. Others suggested that greenhouses could both reduce concerns about contamination, including windblown contamination, and provide a place for growing food and culturally important plants year-round.

Community gardens can also incorporate other programs, such as classes on growing, harvesting, and preparing food and programs where elders or practitioners teach youth about culturally important plants and traditional ways to grow and harvest plants. Interviewees also suggested classes or programs on maintaining bees and the cultural practices in preparing a field and planting practices. Some interviewees noted some of the challenges associated with using a community garden to grow culturally important plants, including the difficulty of cultivating

some culturally important plants such as watercress, and the importance of gathering plants for ceremonial practices from the wild instead of growing these plants in a greenhouse.

Tribal involvement in the restoration project. As described above, all interviewees from all Tribes are interested in participating in a community garden. According to interviewees, an important component of creating a sustainable community garden is having a Tribal member or citizen dedicated to the garden's planting, weeding, and harvesting. Many suggested that this dedicated gardener should be paid, and that volunteers who participate in the community garden should be compensated for their time by obtaining a portion of the food grown in the garden.

Shared versus individual garden facilities. These community gardens could be shared by the Tribes or each Tribe could have their own community garden. When asked if community gardens should be shared by the Tribes, interviewees felt that it is important for each Tribe to have their own garden. Individual gardens by a Tribe will be closer to Tribal members' and citizens' homes, will allow the Tribe to grow their culturally important plants, and develop more personal relationships with community gardens and plants. Although Tribal members and citizens travel to gather culturally important plants, most interviewees felt that Tribal members and citizens would be less willing to travel to a community garden. Therefore, a garden located near Tribal members' and citizens' homes was ideal. Some interviewees noted that there could be a more extensive garden with more gardening facilities, such as a seedbank, with smaller community gardens for each Tribe, and that Tribal members and citizens may be willing to travel to the more extensive garden to collect seeds or to participate in gardening classes or programs.

How Well Does this Restoration Concept Address Injury and Tribal Losses?

Tribal members and citizens felt that a community garden will allow Tribal members and citizens to use the resources affected by contamination from historical mining activities moderately to extremely well (Exhibit 19).

Exhibit 19. How a community garden allows for the use of affected resources

| | Number of Responses | Percent of Total Responses |
|--------------------|---------------------|----------------------------|
| Extremely well | 4 | 40.0% |
| Very well | 3 | 30.0% |
| Moderately well | 3 | 30.0% |
| Slightly well | 0 | 0.0% |
| Not well at all | 0 | 0.0% |
| Total ^a | 10 | |

a. Totals do not sum to the 15 individual interviewees because the small groups responded with one response. There were a total of 10 respondents because 1 interviewee did not know how to respond to this question.

Interviewees also indicated that there are synergies across the four restoration projects, and projects could be combined to provide benefits to ecosystems and Tribal services (Exhibit 20).

Exhibit 20. Leveraging across restoration project concepts

The interviewed Tribal members and citizens were interested in the synergies across the restoration project ideas, and in implementing restoration projects so that they are not isolated projects, but combined in ways to enhance benefits to both ecosystems and Tribal services. In particular, tribal members and citizens mentioned combining the following project ideas:

- Combining the community garden program with elements of the youth cultural learning program (e.g., there may be cultural learning classes and programs that could complement a community garden).
- Culturally important foods and medicines grown in a large community garden, such as a nursery, could provide plants for habitat restoration programs and support learning about how to grow and use culturally important plants.
- Incorporate cultural learning programs into mussel reintroduction to teach youth about the importance of mussels and the cultural uses of mussel shells.
- Incorporate cultural learning programs into habitat restoration to provide an opportunity to transfer traditional knowledge from elders to youth about gathering and harvesting cultural important plants, and becoming good stewards of their land.
- Incorporating learning about the ecology of natural resources into the youth cultural program, in addition to learning about traditional uses of the resources, so that the youth can be long-term stewards of the land.

4.2.5 Other Project Types

In addition to the restoration project described in detail above, Tribal members and citizens mentioned several other project types that could restore affected resources and lost uses associated with mining contamination:

- **GRDA lake release.** Tribal members and citizens indicated that high water levels in Grand Lake cause upstream flooding during high rainfall events, which re-contaminates resources and increases sedimentation that affects culturally important activities, such as reducing water flow and depth for canoeing and noodling. There may be opportunities to work with the agency in charge of lake levels to release water from Grand Lake during high rainfall events, which would reduce upstream flooding. Tribal members and citizens are very interested in finding ways to work with the GRDA to lower water levels; however, many interviewees stressed the importance of GRDA committing resources.
- **Updates to the Miami Wastewater Treatment Plant.** The Miami Wastewater Treatment Plant discharges or releases treated water into the Neosho River. There may be updates that can be made to the treatment facility at the Miami Wastewater Treatment Plant to improve the quality of the water that is released into the Neosho River. Interviewees are interested in this project, but indicated that money going to this project cannot be disproportionate to money spent on other restoration projects.
- **Surface water ponds.** Tribal members and citizens highlighted the development of clean lakes and ponds for wildlife and human recreation, including fishing, swimming, and nature trails as a potential restoration project. Interviewees thought that this would allow for the use of lost surface water resources affected by mining contamination.
- **Sewer and septic improvements.** Tribal members and citizens noted that this project could reduce contamination by making improvements to the failing sewer lines and septic systems of homes in the Sunshine Valley neighborhood, which is contaminating Sycamore Creek. Improvements to these septic systems would clean up Sycamore Creek and could encourage

habitat restoration along the creek. Interviewees noted several areas that have degraded and rudimentary septic systems that could be improved.

- **Tribal Conservation Reserve Program (CRP).** This program is run by Tribes to improve soil, protect water quality, and provide wildlife habitat by enrolling farmers in a CRP-like program to remove land from agricultural production and to plant species that improve environmental health and quality. This could be part of a habitat restoration project with willing ranch and agricultural landowners.

5. Summary of Overarching Themes from the Interview Study

The results of the interviews can be grouped into three overarching themes regarding Tribal use of natural resources:

- Natural resources are used by Tribes for food and cultural practices, and should be available, accessible, healthy, and safe
- Tribal communities maintain traditional knowledge, values, and important beliefs about the use of natural resources; and the knowledge, values, and beliefs should be actively passed from elders to youth
- Tribal communities need to define and lead the implementation of actions meant to restore natural resources and lost Tribal services.

These themes mirror indigenous community health indicators that have been cited elsewhere in the literature on the characteristics of a healthy Tribal population, where “healthy” broadly encompasses physical and spiritual well-being, as well as healthy relationships within a functioning community and with nature (Donatuto et al., 2011, 2016). Below we discuss each of these overarching themes in greater detail.

Natural resources are used by Tribes for food and cultural practices, and should be available, accessible, healthy, and safe. The interviewees provided multiple examples of uses of natural resources for food and cultural practices, and why these resources are important to the Tribes (see Exhibits 3, 6, 7, and 9). Interviewees also described how those practices have changed because of the contamination resulting from historical mining practices in the TSMD, and how this is of concern to them. For example, at least one Tribal member will “suit up like a spaceman” to collect mussels for arts and crafts in order to reduce contact with contaminated water and sediment while collecting mussel shells. Although this Tribal member still uses the resource, his experience is reduced because of concerns over contamination. In addition, Tribal members and citizens have stopped using or have reduced their use of natural resources. For example, many interviewees indicated that Tribal members and citizens no longer gather many culturally important plants or fish, gig, and noodle in locations where they are concerned about contamination. Tribal members and citizens also use substitute materials that they perceive as non-contaminated, such as purchased bamboo for basket-making and purchased clay for pottery, because of concern with contamination of the local plant and soil resources. Many Tribal members and citizens also indicated that they travel long distances to alternative locations to use resources that they perceive as non-contaminated, such as traveling 45 to 60 minutes to gather non-contaminated watercress or horsemint or traveling to swimming holes in Kansas or Missouri

instead of swimming at Grand Lake, Devil's Promenade on the Spring River, and other local swimming holes.

Injuries to natural resources resulting from contamination reduce Tribal members' and citizens' abilities to use natural resources (e.g., gathering and harvesting, fishing, hunting, and ceremonies), thereby leading to a loss of Tribal traditional uses of natural resources. Further, uncontaminated wild plants, wild game, and fish are more nutritious foods than most store-bought goods, and hence a reduction in use of these resources also results in a loss of nutrition and health for the Tribes. Because the Tribes' cultures and uses of natural resources are intrinsically intertwined, the loss of Tribal uses of natural resources contributes to a loss of Tribal identity and meaning and leads to lost transference of information, Tribal practices, traditions, and customs.

Tribal communities maintain traditional knowledge and important beliefs, and the knowledge, values, and beliefs should be actively passed from elders to youth. Knowledge of how to properly gather, prepare, and preserve culturally important natural resources, values, and beliefs are passed down through generations within each Tribal community. The knowledge, values, and beliefs are transferred through teachings from those who hold the knowledge (the elders) to those who are learning and will carry on the knowledge (the youth; Donatuto et al., 2016). The teaching and learning of these Tribal practices – how to hunt, track, and trap animals; gather plants; prepare meals; conduct ceremonies; and other Tribal practices – is what constitutes a traditional education. While the interviewees communicated that there are several factors that have contributed to the interruption of knowledge transfer, including forced relocation from ancestral lands to the Tar Creek area and boarding schools that pressured youth to assimilate, TSMD contamination was identified as a key factor.

The interviewees provided many examples of how there has been an interruption in the transfer of knowledge about traditional and subsistence uses of natural resources, due to the TSMD contamination. Further, because of the changes in use of these resources (e.g., cessation, reduced use or experience, and use of substitutes), the roles and relationships within families and within the Tribal communities are also damaged. For example, we learned that some elders still gather and harvest plants in the wild, but do not bring their children or grandchildren with them because of concerns about contamination from historical mining contamination. Instead, they only feed their children and grandchildren plants that can be grown in a vegetable garden with clean soil or are bought at a grocery store. As a result, knowledge about native, wild-growing food sources is lost to next generations; the roles of gathering food to share with family and community during communal meals and for ceremonies are lost; and teacher-student roles and relationships pertaining to the gathering of plants and other traditional activities are broken. There is also a loss of quality time spent together as a father and son, a mother and daughter, and a family when no longer engaged in these traditional education practices, which can further lead to disruptions in how families interact and function. A few interviewees indicated that Tribal members are concerned about feeding native, wild foods to children, such as wild onions and berries, because of concerns about TSMD contamination and, as a result, “fear of the unknown” is being passed on to the next generation. As this fear is passed on, the culture and the customs are irretrievably lost.

The Tribes are now focused on revitalizing their communities by returning language and knowledge to the community and returning to the land. As one interviewee put it, many Tribes in

the area are working to “re-grow their elders by teaching children about past practices and lifeways.” Proving opportunities for intergenerational transfer of knowledge, values, and beliefs are critical to sustaining Tribal communities and culture.

Tribal communities need to define and lead the implementation of actions meant to restore natural resources and lost Tribal services. Restoration projects can allow Tribal members and citizens to begin to use the affected resources again. But, the Tribes know their own uses of natural resources best, and by extension, how best to restore those resources and their uses. During the second round of interviews, interviewees indicated that it is important to not only restore lost Tribal uses of natural resources, but also for Tribal members and citizens to be directly involved in the development, implementation, and long-term stewardship of the restoration. This was true not only for the youth cultural program and tribal community gardens concepts (for which it might be expected), but also for the streambank habitat and mussel re-introduction restoration concept. For example, interviewees felt that Tribal knowledge is critical to the success of habitat restoration projects because Tribal members and citizens have local and cultural knowledge on what types of vegetation to plant, where and when to plant vegetation, and how to group vegetation to protect it from predation. In addition, Tribal members and citizens could contribute to several aspects of a mussel reintroduction program, including maintaining and monitoring the restoration project.

In all cases, and from all Tribes, we heard unequivocally and strongly that the Tribes should be involved in each aspect of the restoration. Interviewees also suggested that Tribal learning programs should include not only teaching about traditional uses of plants, but also about the long-term ecological stewardship of natural resources, as a further indication of Tribal interest in being involved in all aspects of restoration.

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Appendix A: Round 1 Questionnaire

We are collecting information from you and others who may know about the impacts of metals contamination released from past mining activities in your area. We would like to learn more about how the contamination may have affected your use of plants (such as arrowhead and wild onions), animals (such as crayfish, mussels, and wild game), water (such as streams and springs), soil, and other natural resources. The contamination may have resulted in impacts to fishing, hunting, and gathering plants and other resources for food and medicines; for cultural and ceremonial uses; and for passing on language and traditions. We are also collecting information on things that could be done so that the plants, animals, water, and soil could be used again in ways they were traditionally used before the contamination. This information collection is part of a natural resource damage assessment (NRDA) that your Tribe and other Tribes in the area are conducting, along with state and federal agencies. An NRDA is a process in which Tribal, state, and federal agencies try to determine what improvements can be made to natural resources, including plants, animals, water, and soil, to make up for the impacts of the contamination. This process also involves trying to find ways to make it possible for Tribal members/citizens to use the plants, animals, water, and soil again, in the way they did before the contamination happened.

The questions are broken into three sections, including asking for information about:

1. Resources (plants, animals, water, and soil) and places
2. Uses of these resources (plants, animals, water, and soil)
3. Restoration options.

Section 1: Inquiries about Resources (plants, animals, water, and soil) and Places

To begin, I would like to talk about how contamination from historical mining activities in your area, including the presence of chat, may have affected or changed how you use plants, animals, water, and soil; or specific places.

[If interviewee responds for other household members or Tribal members/citizens, ask: In answering these questions, are you considering only yourself, your household, or all Tribal members/citizens? If needed for context, examples of resources that may have subsistence and cultural importance include fish (in particular “non-game” or “rough” fish), plants, crayfish, frogs, mussels, birds, furbearers (muskrat, raccoon), and wild game (deer, rabbit).]

1.1 Are you aware of contamination from historical mining activities in the area?

☐ Yes; if yes, could you tell me what you know about contamination from historical mining activities in the area?

☐ No

1.2 Are there any plants, animals, water, soil, or places that you are concerned about using because of the contamination?

☐ Yes

☐ No (*Skip to Question 1.3*)

- Can you tell me what plants, animals, water, soil, or places you are concerned about?

Plant / animal / water / soil / place 1: _____

Plant / animal / water / soil / place 2: _____

Plant / animal / water / soil / place 3: _____

Plant / animal / water / soil / place 4: _____

Plant / animal / water / soil / place 5: _____

For each of the different plants, animals, water, soil, or places that you are concerned about using because of contamination from historical mining activities:

- In general, what did you do there?
- What concerns do you have about these plants, animals, water, soil, or places?
- Has your concern changed over time?

☐ Yes; if yes, why and how has it changed, and when did this change occur?

☐ No

1.3 Are there plants, animals, water, soil, or places that you used in the past that you no longer use because of the contamination from historical mining activities?

☐ Yes

☐ No

- Can you tell me what plants, animals, water, soil, or places?

Plant / animal / water / soil / place 1: _____

Plant / animal / water / soil / place 2: _____

Plant / animal / water / soil / place 3: _____

Plant / animal / water / soil / place 4: _____

Plant / animal / water / soil / place 5: _____

For each of the different plants, animals, water, soil, or places that you used in the past that you no longer use because of the contamination:

- In general, what did you do there?
- About when did you stop?

Section 2: Inquiries about Uses of Resources (plants, animals, water, and soil)

[If you answered “Yes” to Question 1.2 or 1.3:]

You indicated that you are concerned about using certain areas and plants, animals, water, and soil; or have stopped using them because of contamination from historical mining practices. I’d like to get a little more information about how often you use or used these plants, animals, water, soil, and places; and how that has changed over time. This change can come in a number of different ways. For example, you may still use certain plants, animals, water, soil, or places, but the experience is reduced because of your concern over the contamination. Or, you may still use the plants, animals, water, soil, or places, just not as often; you may go to other places instead; or you may no longer do certain activities or go to certain places because of the contamination. You may have also changed your use of certain plants, animals, water, soil, or places in some other way.

If there are some specific locations or specific uses of plants, animals, water, soil, or places that you do not feel comfortable providing, please don’t provide them. The general region and types of uses are fine for our purposes.

Current Resource (plants, animals, water, and soil) Uses

In the questions outlined below, specific plants (e.g., arrowhead or wild onion), animals (e.g., mussels or wild game), water (streams or springs), and soil; and the action (e.g., harvesting arrowhead or mussels or hunting wild game) would be discussed. These questions would be asked for each of the specific resources/activities/places that are currently used by Tribal members/citizens.

[If you answered “Yes” to Question 1.2:] First, I would like to focus on the plants, animals, water, and soil that you still use and places where you still go.

[If interviewee responds for other household members or Tribal members/citizens, ask: In sharing this information, are you considering only yourself, your household, or all Tribal members/citizens?]

2.1 In general, where do you go to [action (e.g., gather or hunt)] [resource (e.g., plants or animals)]?

- About how far do you travel to get to this site and about how long does it take to get there?
- How often do you [action (e.g., gather or hunt)] [resource (e.g., plants or animals)] at this site (e.g., how many times a month/season/year)?
 - Do you have any concerns about [action (e.g., gather or hunt)] [resource (e.g., plants or animals)] at this site?
 - ☐ Yes; if yes, what are your concerns?
 - ☐ No (*Skip to the next question*)

- [Probe:] Do you have any concerns about [action (e.g., gather or hunt)] [resource (e.g., plants or animals)] because of the contamination and the chat that are there?
 - ☐ Yes; if yes, what are your concerns?
 - ☐ No (Skip to the next question)
 - Has your use of this site changed over time?
 - ☐ Yes; if yes, how has your use of the site changed over time?
 - ☐ No (Skip to the next question)
 - How long do you usually stay at the site to [action (e.g., gather or hunt)] [resource (e.g., plants or animals)]? (Hours/days per trip/year?)
 - [If the use of this site has changed over time:] In the past, how long did you usually stay at the site to [action (e.g., gather or hunt)] [resource (e.g., plants or animals)]? (Hours/days per trip/year?)
 - [For hunting/harvesting activities:] How [many/much] [plants (e.g., arrowhead or wild onion) or animals (e.g., mussels or wild game)] do you get each time?
 - Do you have any concerns about the [plants (e.g., arrowhead or wild onion) or animals (e.g., mussels or wild game)] you [harvest/hunt]? If yes, what are your concerns?
 - [Probe:] Do you have any concerns about the [plants (e.g., arrowhead or wild onion) or animals (e.g., mussels or wild game)] you [harvest/hunt] because of the contamination?
 - [If use of this site has changed over time:] In the past, how [many/much] [plants (e.g., arrowhead or wild onion) or animals (e.g., mussels or wild game)] do you get each time?
 - Do you know how many Tribal members/citizens participate in [action (e.g., gather or hunt)] [resource (e.g., plants or animals)] in this area? If many, are the Tribal members/citizens who participate typically related to each other (e.g., of the same household)?
 - Do you take your children, grandchildren, or other youth to this area to teach them how to [action (e.g., gather, hunt, swim)] [resource (e.g., plants, animals, water)]?
- 2.2 Are there other areas where you could go (or have to go) to [action (e.g., gather, hunt, swim)] [resource (e.g., plants, animals, water)]?
- How do these other areas compare to the area where you currently go to [action (e.g., gather or hunt)] [resource (e.g., plants, animals)] (e.g., ease of access, quality of plants and animals, or distance from household)?

Stopping of Resource (plants and animals) Uses

In the questions outlined below, specific plants (e.g., arrowhead or wild onion), animals (e.g., mussels or wild game), water (streams and springs), and soil; and the action (e.g., harvesting arrowhead or mussels, hunting wild game, swimming in streams, hiking through soil) would be discussed. These questions would be asked for each of the specific plant, animal, water, soil, or places that are currently used by Tribal members/citizens.

[If you answered “Yes” to Question 1.3:] Now I would like to focus on the plants, animals, water, soil, and places that you said you no longer use because of the contamination. I would like to better understand why these plants, animals, water, soil, or places are no longer used.

[If interviewee responds for other household members or Tribal members/citizens, ask: In sharing this information, are you considering only yourself, your household, or all Tribal members/citizens?]

2.3 In general, where do you no longer go to [action] [resource]?

- Why don't you go there anymore?
- About when did you stop (using [resource]/going there)?
- About how far did you have to travel to get to this site and about how long did it take to get there?
- How often did you [action] [resource] at this site (e.g., how many times a month/year)?
- How long did you usually stay at the site to [action] [resource] (hours/days per trip/year)?
- *[For harvesting/hunting activities:]* How *[many/much]* *[plants (e.g., arrowhead or wild onion) or animals (e.g., mussels or wild game)]* did you get each time?
- How many Tribal members/citizens participated in [action] [resource] in this area? If many, were the Tribal members/citizens who participated typically related to each other (e.g., of the same household)?
 - Do you take your children, grandchildren, or other youth to this area to teach them [action] [resource]?

2.4 Are there other areas where you could go (or have to go) to [action] [resource]?

- How do these other areas compare to the area you used to go to [action] [resource] (e.g., ease of access, quality of plants, animals, water, soil, or distance from household)?

Section 3: Inquiries about Restoration Options

Thank you very much. We are moving to the last area that we would like to discuss – projects that may help to improve the conditions that we have been talking about so far.

Under the NRDA process, Tribes can identify things that could be done to make it possible to use the plants, animals, water, and soil again, in the ways you did before the contamination and chat. These are called restoration projects, and might include things like projects that help to restore the plants, animals, water, and soil that have been affected by the contamination, such as replanting native plants that used to grow in the area; and projects that help to restore Tribal uses of the plants, animals, water, and soil that have been impacted by the contamination. This could include things like educational programs, such as youth hunting programs, or other programs that connect elders with youth to enable learning about traditional uses of plants, animals, water, and soil. It is not always possible to restore the affected plants, animals, water, soil, and places to the same condition that existed prior to the contamination; or to restore the traditional uses that have been lost. However, sometimes it is possible to find projects that can at least make improvements to the conditions caused by the historical mining and contamination, and for Tribes to begin to practice traditional activities with the plants, animals, water, and soil again. Under the NRDA process, Tribes can also identify projects that provide similar plants, animals, water, and soil in accessible and nearby locations (different from those lost) that can be used instead of the ones lost by the contamination.

At this early stage, we are just trying to collect information about the types of projects that members or citizens of the Tribe think could make up for the impacts of the contamination. In follow-up interviews, there will be a more complete process of restoration project review and evaluation, but for right now we are trying to get information about any projects that members or citizens of the Tribe think might address these losses.

3.1 Do you know if any such projects have been undertaken on Tribal land? *[If no, continue to Question 3.2; if yes:]*

- What types of projects have been undertaken?
- Where have these projects been undertaken?
- Who were involved in these projects?
 - *[Probe:]* Were Tribal youth involved in these projects?

3.2 Are there habitat improvement projects that you think could improve the Tribe's plants, animals, water, and soil; or uses of the plants, animals, water, and soil or specific places? *[If no, continue to Question 3.3; if yes:]*

- What types of projects?
 - *[Probe, give examples if needed to encourage discussion:]* For example, habitat restoration projects could include installing cattle fencing to protect streambanks, support native plants, and improve water quality. Another example is providing access to plants, animals, water, and soil that have been used in traditional ways.
- How do you think these projects would help address the impacts to plants, animals, water, and soil and uses by the Tribe?

3.3 Are there projects you think could help make it possible to use the plants, animals, water, and soil again in the way they were used before the contamination from historical mining practices? *[If no, continue to Question 3.4; if yes:]*

- What types of projects?
 - *[Probe, give examples to encourage discussion:]* For example, educational programs for youth.
- How do you think these projects would help?

3.4 Do you know if there are educational activities (e.g., school garden, public health outreach) to teach children and community members how plants, animals, water, and soil were historically used by the Tribes?

- If yes, please describe those activities.

We would like to thank you very much for your time today. Your input is valuable in helping to understand the impacts that contamination from historical mining practices have had on Tribal members/citizens, and to refine and focus this information-gathering process for future discussions.

Is there anything else you would like to add, or other information you think we should know?

Thank you again for your time.

Appendix B: Round 2 Questionnaire and Handouts

In December 2017, we interviewed you and others from your Tribe to collect information about the impacts of contamination released from past mining activities in your area. Today, we would like to learn more about how the contamination may have affected your use of plants (such as strawberries and wild onions), animals (such as fish, crayfish, mussels, and wild game), water (such as streams and springs), and other natural resources. We would then like to discuss the types of things you think could be done to improve the condition of the land, plants, animals, and water that have been affected by the mining contamination, and the types of things that could be done to return Tribal practices and uses of land, plants, animals, and water to ways they were used before the contamination.

This information collection is part of a natural resource damage assessment (NRDA) that your Tribe and other Tribes in the area are conducting, along with state and federal agencies. An NRDA is a process in which Tribal, state, and federal agencies try to determine what improvements can be made to the land, animals, plants, and water to make up for the impacts of the contamination, and determine what can be done to bring back Tribal practices that stopped or changed because of the contamination.

[Note: Some of the questionnaire terminology will be tailored by the Tribe; these instances are indicated in the text with square brackets.]

1. Do you have any questions before we begin the interview?

[Note: These instructions will vary by the time allotted to the interview. If one-and-a-half hours are allotted to the interview, we will not provide a break. If two hours are allotted to the interview, we will provide a break and these instructions:] We plan to spend about 45 minutes discussing the impacts of contamination on plants, animals, and water from historical mining activity. We will then take a 10-minute break. When we return from the break, we will spend about one hour discussing potential restoration projects.

Impacts of Contamination from Historical Mining Activities

In our previous discussions, we asked you and other Tribal *[members/citizens]* about how potential mining contamination may have affected or changed your use of plants, animals, water, and places. Today, we want to learn more about your use of these plants, animals, water, and places. To help us with this discussion, we will look at several handouts together.

Impacts on Plants and Use of Plants

Handout 1 lists the types of plants that were mentioned by Tribal *[members/citizens]* during our first round of interviews. From the list, we would like to learn more about how you, your parents, your grandparents, other family members, or others from your Tribe use these types of plants and how this use may have changed because of contamination from historical mining activities.

[Give the interviewee a few seconds to review the plant categories listed on the handout. For each plant category listed on Handout 1, ask:] DOI

2. How do you or other Tribal *[members/citizens]* use *[plant category]*? For example, is it used for food or medicine, or other uses?

- a) *[Probe:]* If you don't use *[plant category]* anymore, did your parents, grandparents, other family members, or others from your Tribe use it in the past? How did they use it? For example, did they eat it or use it as a medicine?
3. Have you or other Tribal *[members/citizens]* changed the use of *[plant category]* because of the contamination?
 - a) *[Probe:]* How has your or other Tribal *[members/citizens]* use of *[plant category]* changed because of the contamination? For example, do you gather it less frequently, or do you still eat it yourself but you don't teach your children or grandchildren about it or feed it to your children or grandchildren?
 - b) *[Probe:]* Did your parents, grandparents, other family members, or others from your Tribe change their use of *[plant category]* because of the mining contamination?
 - c) *[Probe:]* Do you or other Tribal *[members/citizens]* use substitutes for *[plant category]* or travel to other locations to gather it? Why do you use substitutes?

Impacts on Animals and Use of Animals

Handout 2 lists several types of animals that were mentioned by Tribal *[members/citizens]* during our first round of interviews. Again, we would like to learn more about how you, your parents, your grandparents, other family members, or others from your Tribe use these types of animals and how this use may have changed because of contamination from historical mining activities.

[Give the interviewee a few seconds to review the animal categories listed on the handout. For each animal category listed on Handout 2, ask:]

4. How do you or other Tribal *[members/citizens]* use *[animal category]*? For example, is it used for food or medicine, or other uses?
 - a) *[Probe:]* If you don't use *[animal category]* anymore, did your parents, grandparents, other family members, or others from your Tribe use it in the past? How did they use it? For example, did they eat it or use it as a medicine?
5. Have you or other Tribal *[members/citizens]* changed the use of *[animal category]* because of the contamination?
 - a) *[Probe:]* How has your or other Tribal *[members/citizens]* use of *[animal category]* changed because of the contamination? For example, do you gather it less frequently, or do you still eat it yourself but you don't teach your children or grandchildren about it or feed it to your children or grandchildren?
 - b) *[Probe:]* Did your parents, grandparents, other family members, or others from your Tribe change their use of *[animal category]* because of the mining contamination?
 - c) *[Probe:]* Do you or other Tribal *[members/citizens]* use substitutes for *[animal category]* or travel to other locations to fish or hunt for *[animal category]*? Why do you use substitutes?

Impacts on Water and Use of Water

Handout 3 lists several types of surface water (e.g., lake water, stream water, spring water) and groundwater mentioned by Tribal [*members/citizens*] during our first round of interviews. Again, we would like to learn more about how you, your parents, your grandparents, other family members, or others from your Tribe use these types of surface water and groundwater, and how this use may have changed because of contamination from historical mining activities.

[Give the interviewee a few seconds to review the list of water categories listed on the handout. For each water category listed on Handout 3, ask:]

6. How do you or other Tribal [*members/citizens*] use water from [*water category*]? For example, do you drink the water or use it in practices?
 - a) [*Probe:*] If you don't use water from [*water category*] anymore, did your parents, grandparents, other family members, or others from your Tribe use it in the past? How did they use it? For example, did they use water from [*water category*] to drink, as a medicine, or for ceremonies?
7. Have you or other Tribal [*members/citizens*] changed the use of water from [*water category*] because of the contamination?
 - a) [*Probe:*] How has your or other Tribal [*members/citizens*] use of water from [*water category*] changed because of the contamination? For example, do you gather it less frequently, or do you still use it yourself but you don't teach your children or grandchildren about it?
 - b) [*Probe:*] Did your parents, grandparents, other family members, or others from your Tribe change their use of water from [*water category*] because of the mining contamination?
 - c) [*Probe:*] Do you or other Tribal [*members/citizens*] use substitutes for water from [*water category*] or travel to other locations to use water from [*water category*]? Why do you use substitute sites?

Types of Restoration and Restoration Attributes

Now we would like to ask you some questions about what can be done to repair the damage that has been caused by the mining contamination. Before we discuss those restoration ideas, I would like to remind you about restoration projects under the NRDA process.

Restoration Project Background

Under the NRDA process, restoration projects are things that could be done to improve conditions so that streams, rivers, grasslands, and the plants and animals that live in them are returned to better conditions; and also make it possible to use the plants, animals, and water again in the ways you did before the contamination. In other words, restoration projects might include:

- Projects that help to restore the plants, animals, and water that have been affected by the contamination, such as replanting native plants that used to grow in the area, and

- Projects that help to restore Tribal uses of the plants, animals, and water that have been affected by the contamination, such as a youth hunting program that connects [elders/practitioners/members/citizens] with youth to enable learning about Tribal uses of plants, animals, and water.

It is not always possible to return the affected land and water back to the same condition that existed before the mining contamination so that they can support healthy plants and animals again. It is also not always possible to fully return the Tribal uses that have been lost because of the contamination. However, sometimes it is possible to find projects that can at least make improvements to the conditions caused by the contamination from historical mining activities; and for Tribes to begin to practice Tribal activities with the plants, animals, and water again. Under the NRDA process, Tribes can also identify projects that provide similar plants, animals, and water in nearby clean (or uncontaminated) locations that can be used in Tribal practices, instead of the ones lost due to the contamination.

Restoration Project Ideas

In previous discussions, we asked you several questions about the types of projects you think could make up for the impacts of the contamination. During those discussions, we learned about several potential restoration projects.

Today we are going to discuss four of these restoration project ideas, each of which were suggested by multiple Tribal [members/citizens]. For each of the four restoration project ideas, we will share a handout that describes the restoration project ideas and we will discuss different aspects of the project.

8. Do you have any questions before we discuss the restoration project ideas?

Restoration Project Idea #1: Habitat Restoration along the Streambank

Handout 4 describes a habitat restoration project to plant native species and culturally important species along streambanks. As described in Handout 4:

This restoration project involves improving low-quality streambank habitat to create high-quality native habitat. The habitat restoration would occur on the upper reaches of streams and creeks in locations that are not affected by the mining contamination. Habitat restoration could include several components: (1) seeding or planting native, culturally important vegetation; (2) installing cattle fencing to prevent cattle from grazing on the new vegetation and entering eroded streambank areas; and (3) controlling the spread of non-native (or invasive) species, such as alligator weed, thistles, or purple loosestrife.

Now I would like your thoughts on important aspects of this restoration project.

9. Can you describe the natural streambank habitat that used to be here (or, that you would like to see here)? [Probe:] For example, what sort of topography or other land features should be present in a natural streambank?
10. What types of habitat restoration would you like to see on the upper reaches of streams and creeks in locations that are not affected by the mining contamination? For example, seeding or planting native, culturally important vegetation; installing cattle fencing to prevent cattle

from grazing on the new vegetation and entering eroded streambank areas; or controlling the spread of non-native (or invasive) species.

- a) [*Probe:*] Are there any areas in the upper reaches of streams and creeks where you would like to see habitat restoration occur? [*Hand over interviewee map: If helpful, here is a map of the area with streams and creeks.*]
 - b) [*Probe:*] Should habitat restoration occur only around Tribal areas or is it acceptable to undertake habitat restoration outside Tribal areas?
 - c) [*Probe:*] Are there particular types of vegetation that you would like to see planted as part of restoring the streambank habitat?
 - d) [*Probe:*] Are there other aspects of a streambank restoration project that would be important, such as accessibility for the elderly? What about the distance to your home?
11. Do you think it is important to have Tribal [*members/citizens*] involved in the streambank restoration activities, such as planting or seeding culturally important and native vegetation species, and caring for the restoration site as the plants grow? [*If yes:*]
- a) Why do you think this is important? [*Probe:*] Is there Tribal knowledge that is critical to the project's success, such as where or when to plant certain types of vegetation?
 - b) Do you think Tribal participants would need to be paid to participate in these restoration activities?
 - c) Could this restoration project be part of a youth cultural education program, where Tribal [*elders/practitioners/members/citizens*] lead the restoration and youth participate, learning as they help?

This habitat restoration could either occur on land that is first acquired; or it could occur on land that is privately owned, such as ranch or agricultural land, with willing landowners. On acquired land, the restored habitat would be accessible to the Tribe and it could be possible to engage in activities at the site, including collecting and using plants, hunting or trapping animals, and fishing or collecting freshwater animals. However, there may be limited opportunities to buy land in the area, or it might take a long time for land to become available for sale.

On ranch and agricultural lands, the land, plants, animals, and water that would be restored would benefit from the improved conditions, but the Tribe would not have access to gather or collect them. There may be willing landowners who would participate in restoration projects on their lands right now, which would improve streambank habitat sooner rather than later.

12. Do you think habitat restoration should occur on lands that are acquired by the Tribes? Why?
- a) [*Probe:*] Do you think there are opportunities to buy land for habitat restoration?
 - b) [*Probe:*] What types of habitat restoration are appropriate for acquired land?
 - c) [*Probe:*] What types of activities would you or other Tribal members/citizens you know want to do at the site? For example, would you want to collect and use plants, hunt or trap animals, or fish or collect freshwater animals?

- d) [*Probe:*] Do you think acquiring land and undertaking these habitat restoration activities is a good way to make up for the impacts of the contamination from historical mining activities? Would you say it is an extremely good way, a very good way, a moderately good way, a slightly good way, or not a good way at all?
- e) [*Probe:*] How well do you think habitat restoration on acquired land will allow Tribal [*members/citizens*] to begin to use the types of plants and animals affected by contamination from historical mining activities? Would you say extremely well, very well, moderately well, slightly well, or not well at all?

13. Do you think habitat restoration should occur on ranch and agricultural lands? Why?

- a) [*Probe:*] Do you think there are opportunities to restore habitat on ranch and agricultural lands? In other words, are ranchers and agricultural landowners willing to participate in a habitat restoration program?
- b) [*Probe:*] What types of habitat restoration are appropriate for ranch and agricultural lands? For example, is cattle fencing around streambanks appropriate? What about seeding or planting native, culturally important vegetation or controlling non-native plant species?
- c) [*Probe:*] Do you think habitat restoration on ranch and agricultural lands should include a legal agreement between the landowners and the Tribes in order to protect the benefits provided by the restoration project(s)? If so, how many years should the land be protected by the agreement (e.g., 10 years, 20 years, in perpetuity)?
- d) [*Probe:*] Do you think doing these restoration activities on ranch and agricultural lands is a good way to make up for the impacts of the contamination from historical mining activities? Would you say it is an extremely good way, a very good way, a moderately good way, a slightly good way, or not a good way at all?

Restoration Project Idea #2: Reintroducing Native Mussels into Rivers, Streams, and Creeks

Handout 5 describes a restoration project to reintroduce native mussels into rivers, streams, and creeks. As described in Handout 5:

This restoration project would involve reintroducing native mussel species that are no longer present or present in fewer numbers because of the mining contamination. The mussel species could be reintroduced into the upper reaches of uncontaminated streams and creeks that are side tributaries to the Spring and Neosho rivers. The mussels would naturally move and spread into downstream areas, after these areas are cleaned up.

Now, I would like your thoughts on important aspects of this restoration project.

- 14. Are there places where you would like to see restoration of mussels in the upper reaches of streams and creeks?
- 15. Do you think it is important to have Tribal [*members/citizens*] involved in the restoration activities, such as reintroducing native mussel species to the area and maintaining and monitoring the restoration project? [*If yes:*]

- a) Why do you think this is important? [*Probe:*] Is there Tribal knowledge that is critical to the project's success, such as identifying side tributaries, successfully reintroducing mussels, and tracking the progress of the reintroduced mussels over a period of time?
 - b) Do you think participants will need to be paid to participate in these restoration activities?
 - c) Could this mussel reintroduction project be part of a youth cultural education program, where Tribal [*elders/practitioners/members/citizens*] lead the restoration activities and youth participate, learning as they help?
16. Do you think reintroducing native mussels like this into the upper reaches of uncontaminated streams and creeks is a good way to make up for the impacts of the contamination from historical mining activities? Would you say it is an extremely good way, a very good way, a moderately good way, a slightly good way, or not a good way at all?
17. How well do you think this restoration project will allow Tribal [*members/citizens*] to begin to practice cultural activities with mussels again, such as gigging, ceremonies, and crafts with the native mussels? Would you say extremely well, very well, moderately well, slightly well, or not well at all?

Restoration Project Idea #3: Youth [*cultural learning/apprenticeship*] Program

Handout 6 describes a [*cultural learning/apprenticeship*] program for youth. As described in Handout 6:

A [*cultural learning/apprenticeship*] program for youth can support Tribal communities through the teaching and preservation of cultural practices, Tribal knowledge, and values. This restoration project is similar to culture camps that some Tribes hold in the summertime, but is a more involved and often longer program. It includes [*elders/practitioners*] or teachers sharing cultural practices and Tribal knowledge with youth or students. These youth or students then share the cultural practices and Tribal knowledge with the larger community.

18. Does your Tribe already have a [*cultural learning/apprenticeship*] program? [*If yes:*]
- a) Please describe your current [*cultural learning/apprenticeship*] program. [*Probes:*] Where is it held? How long does it run? Who runs the program?
 - b) Do you think the Tribe would be interested in extending it to a year-round program or expand the offerings of the current [*cultural learning/apprenticeship*] program?

We understand that a cultural learning program may include Tribal knowledge about how, when, and where plants are collected or gathered; and how they are prepared for consumption. It could also include Tribal hunting and fishing practices, such as trapping small game or gigging fish. There may also be opportunities to incorporate language learning or other important Tribal practices into a [*cultural learning/apprenticeship*] program.

19. In your opinion, what cultural practices, Tribal knowledge, language, and values should this [*cultural learning/apprenticeship*] program teach?

20. Do you think you and other Tribal [*elders/practitioners*] would be interested in acting as teachers to the Tribal youth who participate in such a program?

- a) [*Probe:*] Do you think younger Tribal [*members/citizens*] would be interested in participating in this program?
- b) [*Probe:*] Do you think teachers would need to be paid to participate in this program?

This project could include the development of learning facilities, which may consist of indoor or outdoor facilities to support learning. Indoor facilities could include a space to store a seed bank of uncontaminated seeds for use by Tribal [*members/citizens*]; cooking facilities to learn how to prepare family meals; and/or working space for making tools used in hunting, fishing, art, or other activities. Outdoor facilities could include greenhouses and a habitat space in which to teach and learn Tribal gathering, fishing, and hunting practices.

21. Do you think indoor facilities would be necessary to support a [*cultural learning/apprenticeship*] program? [*If yes:*]

- a) What types of indoor facilities are needed to facilitate traditional learning?
- b) What types of indoor equipment are needed to facilitate traditional learning (e.g., plumbing, firewood, cooking pots, utensils, jars)?

22. Do you think outdoor facilities would be necessary to support a [*cultural learning/apprenticeship*] program? [*If yes:*]

- a) What types of outdoor facilities are needed to facilitate traditional learning?
- b) What types of outdoor equipment are needed to facilitate traditional learning (e.g., outhouses, firewood, cooking pots, utensils, jars)?

23. The learning facilities could be shared by the Tribes or each Tribe could have its own learning facilities. Shared learning facilities would be more extensive than individual Tribal learning facilities. For example, shared learning facilities might have more acreage or more equipment available for cultural activities than individual Tribal learning facilities. However, shared learning facilities may also be farther away from Tribal [*members/citizens*] homes.

Do you think the learning facilities for the [*cultural learning/apprenticeship*] program should be shared by the Tribes or do you think each Tribe should have its own facilities for the program? Why?

- a) Are Tribal [*members/citizens*] willing or able to travel to use the learning facilities?
- b) How far are you or other Tribal [*members/citizens*] you know willing to travel (in minutes or miles)?

24. How well do you think a [*cultural learning/apprenticeship*] program will allow Tribal [*members/citizens*] to practice traditional activities with the plants, animals, and water affected by contamination from historical mining activities? Would you say extremely well, very well, moderately well, slightly well, or not well at all?

Restoration Project Idea #4: Community Gardens

Handout 7 describes a community garden project. As described in Handout 7:

Community gardens can help Tribes grow and protect culturally important foods and medicines for Tribal members/citizens in a traditional way. Community gardens can also provide a place for education and learning: a place where *[elders/practitioners]* can teach youth about culturally important food items, how they are grown and harvested, and then prepared for eating. Gardens can take different forms, such as garden beds for Tribal *[members and citizens]* to grow their own food or a larger operation that can grow and harvest food for the larger Tribal community.

25. Does your Tribe already have a community garden? *[If yes:]* Please describe how the Tribe currently uses the community garden.

26. Do you think Tribal *[members/citizens]* would be interested in participating in *[a new/an expanded]* community garden program?

[If no because of concern with contamination:]

a) Are there things that can be done to make Tribal *[members/citizens]* feel comfortable with participating in the community garden program? *[If yes:]*

b) What types of things can be done? *[Probes, if needed:]* For example, would Tribal *[members/citizens]* feel comfortable with participating in the community garden if garden beds were raised with soil brought in from non-contaminated areas? What about if the plants were grown in a greenhouse?

27. Participants of the program could be compensated for their time participating in this community garden program. Compensation could include payment to participate in the program or a portion of the food grown in the garden. Do you think participants will need compensation to participate in this program?

28. As described earlier, community gardens can take different forms. Do you think the community garden should be individual garden beds for Tribal *[members/citizens]* to grow their own food, or a larger operation that can grow and harvest food for the community? Why?

29. A community garden can also incorporate other programs, such as classes on gardening where Tribal *[members/citizens]* learn to grow and harvest plants and food, *[elders/practitioners/citizens]* teaching youth about culturally important plants, traditional ways to grow and harvest plants, or cooking classes on food preparation. In your opinion, what types of programs should be associated with a community garden?

30. Community gardens could be shared by the Tribes or each Tribe could have its own community garden. Shared gardens would be more extensive than individual Tribal learning facilities. For example, gardens shared by the Tribes could grow more plants, have more gardening facilities such as raised garden beds and greenhouses, and provide more programs on growing and harvesting plants or cooking classes. However, shared gardens facilities may also be farther away from Tribal *[members/citizens]* homes.

Do you think community gardens should be shared by the Tribes or do you think each Tribe should have its own community garden? Why?

- a) Are Tribal [*members/citizens*] willing or able to travel to use a community garden?
 - b) How far are you or other Tribal [*members/citizens*] you know willing to travel (in minutes or miles)?
31. How well do you think a community garden will restore traditional practices, allowing Tribal [*members/citizens*] to use traditional methods to grow and harvest plants affected by the contamination from historical mining activities? Would you say extremely well, very well, moderately well, slightly well, or not well at all?

Additional or New Restoration Project Ideas

Now that you have had some time to think about the types of restoration projects that you think may make improvements to the conditions caused by contamination from historical mining activities:

32. Are there projects that we have not discussed that you think could improve the plants, animals, and water affected by contamination from historical mining activities?
- a) [*Probe:*] What types of projects?
 - b) [*Probe:*] How do you think these projects would help?
33. Are there projects that we have not discussed that you think could improve the use of the plants, animals, and water affected by contamination from historical mining activities?
- a) [*Probe:*] What types of projects?
 - b) [*Probe:*] How do you think these projects would help?

Other Restoration Project Ideas (if time permits)

In addition to mining contamination, Tribal [*elders/practitioners/members/citizens*] identified several other environmental stressors faced by the Tribes. Restoration activities could also improve native habitats and water quality by reducing impacts from these other environmental stressors.

34. For example, Tribal [*elders/practitioners/members/citizens*] indicated that the high water levels in Grand Lake cause upstream flooding during high rainfall events. There may be opportunities to work with the agency in charge of the lake levels to release water from Grand Lake during high rainfall events, which would reduce upstream flooding. Is this something that you would be interested in pursuing as a possible restoration project? Why?
35. In addition, the Miami Wastewater Treatment Plant discharges or releases treated water into the Neosho River. There may be updates that can be made to the treatment facility at the Miami Wastewater Treatment Plant to improve the quality of the water that is released into the Neosho River. Is this something that you would be interested in pursuing as a possible restoration project? Why?

Thank you.

We would like to thank you very much for your time today. Your input is valuable in helping to understand the impacts that contamination from historical mining practices have had on Tribal [*members/citizens*] and to refine and focus this information-gathering process for future discussions.

Is there anything else you would like to add, or other information you think we should know?

Thank you very much for your time.

Handout 1: Plant categories

a. Fruits and berries
(blackberries, strawberries, huckleberries, wild cherries, pawpaw, and persimmons)



d. Nuts and seeds
(black walnut, acorns, pecans and hickory nuts, and sunflower seeds)



b. Greens
(poke, dandelions, watercress, and wild asparagus)



e. Bark and leaves
(willow, buckbrush, and mullein)



c. Roots and bulbs
(arrowroot, wild onions, and cattail and sassafras roots)



f. Cultivated plants
(corn, beans, squash, pumpkins, cucumbers, and gourds)

Handout 2: Animal categories



a. Fish and other freshwater animals
(catfish, frogs, crawdads, mussels, and turtles)



b. Birds
(ducks, prairie chicken, quail,
wild turkey, and migratory songbirds)



c. Wild game
(deer, rabbits, squirrels, raccoon, possum,
woodchuck, coyotes, beaver, mink, and otter)

Handout 3: Water categories

a. Lakes
(Grand Lake)



d. Springs
(Beaver Springs)



b. Rivers
(Spring and Neosho)



e. Groundwater or aquifers



c. Creeks
(Sycamore, Lost, Elm, and Tar)

Handout 4: Habitat restoration along the streambank

This restoration project involves improving low-quality streambank habitat to create high-quality native habitat. The habitat restoration would occur on the upper reaches of streams and creeks in locations that are not affected by the mining contamination.

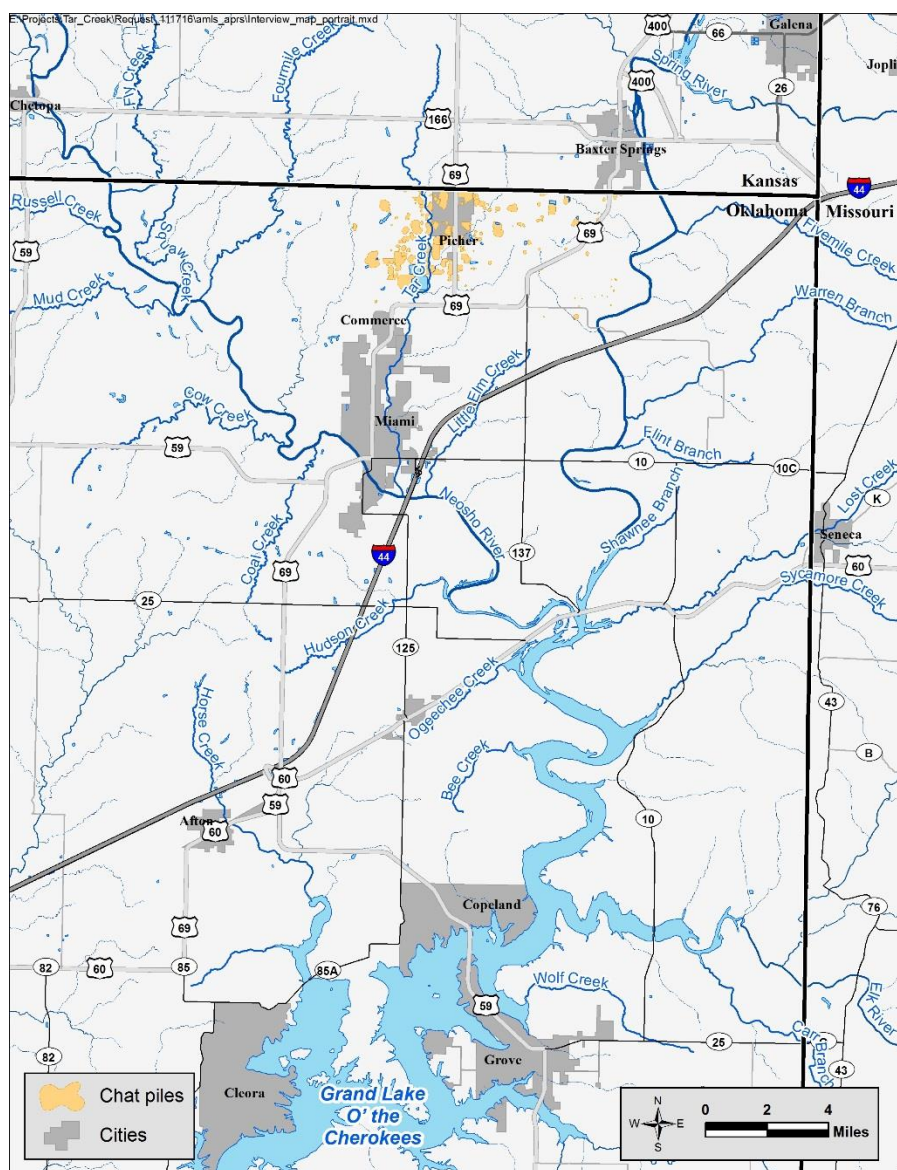
Habitat restoration could include several components:

- 1) Seeding or planting native, culturally important vegetation;
- 2) Installing cattle fencing to prevent cattle from grazing on the new vegetation and entering eroded streambank areas; and
- 3) Controlling the spread of non-native (or invasive) species, such as alligator weed, thistles, or purple loosestrife.



Handout 5: Reintroduce native mussels into rivers, streams, and creeks

This restoration project would involve reintroducing native mussel species that are no longer present or present in fewer numbers because of the mining contamination. The mussel species could be reintroduced into the upper reaches of uncontaminated streams and creeks that are side tributaries to the Spring and Neosho rivers. The mussels would naturally move and spread into downstream areas, after these areas are cleaned up.



Handout 6: Youth cultural learning programs

A cultural learning program for youth can support Tribal communities through the teaching and preservation of cultural practices, Tribal knowledge, and values.

This restoration project is similar to culture camps that some Tribes hold in the summertime, but is a more involved and often longer program. It includes elders or teachers sharing cultural practices and Tribal knowledge with youth or students. These youth or students then share the cultural practices and Tribal knowledge with the larger community.



Handout 7: Community gardens

Community gardens can help Tribes grow and protect culturally important foods and medicines for Tribal members/citizens in a traditional way. Community gardens can also provide a place for education and learning: a place where elders can teach youth about culturally important food items, how they are grown and harvested, and then prepared for eating. Gardens can take different forms, such as garden beds for Tribal members/citizens to grow their own food or a larger operation that can grow and harvest food for the larger Tribal community.

